THE FOUNDRY.

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THE FOUNDRY PUBLISHING CO
DETROIT

No. 52

Sometimes

There is more truth in an advertisement than would appear on the surface. It will cost only two cents to get at the bottom of this one . . . . . .

Foundry Facings,

Blackings, Plumbago,

Machinery, Apparatus,

and General Foundry Supplies

ARE VERY CHEAP NOW. If there ever was a time to buy, IT IS NOW. The man who needs something in this line now, or will soon, should not fail to write us, enclosing a list of wants.

The J. D. Smith Foundry Supply Co.

Manufacturers of
Foundry Facings,
Blackings, Foundry
Supplies and Refiners
of Plumbago.

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THE FOUNDRY

A TRADE JOURNAL

DEVOTED TO THE INTERESTS OF THE WHOLE FOUNDRY BUSINESS

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SEPTEMBER, 1896.

Vol. VIII. No. 49.

Published Monthly by THE FOUNDRY PUBLISHING CO.

DETROIT, MICH.

ESTABLISHED 1879.

WE HAVE TAKEN ADVANTAGE OF SLOW BUSINESS THE PAST TWO MONTHS TO COMPLETELY OVERHAUL OUR PLANT, AND WILL START IN FULL TIME JUNE 1st.

THE MOST COMPLETE CONCERN OF ITS KIND IN THE COUNTRY.

Our Product will be in Quality

EQUAL TO THE BEST,

And our Prices will be the Lowest.

WHEN IN NEED OF ANYTHING THE FOUNDER USES, EXCEPTING ONLY METAL AND FUEL, GET OUR PRICES.

Our Royal Plumbago Ad. Last month took well. Here are a few more bargains

Radiant Brand East India Silver Lead, Three Cents per Pound.

E. I. Ingot Mold Wash, Three Cents per Pound.

The J. D. Smith Foundry Supply Co.

Foundry Equippers,
Manufacturers of
Foundry Facings,
Blackings and Supplies.

CINCINNATI, OHIO.
U. S. A.

REFINERS OF

PLUMBAGO

and Black Lead.

THE FOUNDRY

VOL. 8. DETROIT, MICH., SEPT., 1896. No. 49

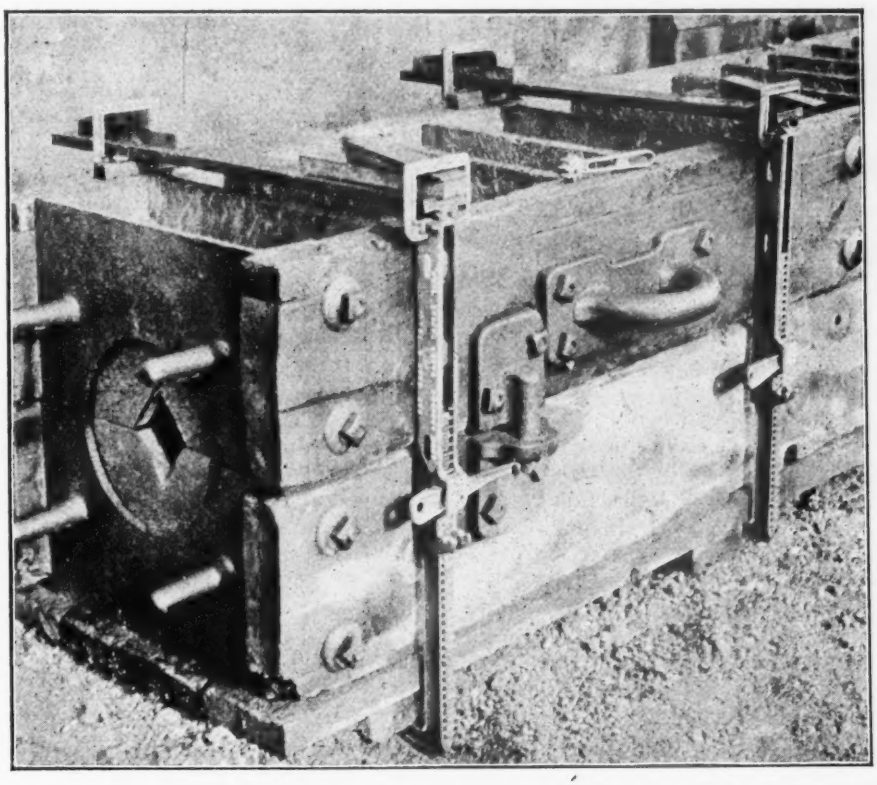
An Adjustable Clamp.

The up-to-date foundryman does not need any lengthy dissertation on the value of an adjustable clamp or a set of adjustable clamps for shop use. While they have not come into as universal use as might be expected, yet they are rapidly becoming more and more appreciated as they are being improved upon from time to time.

The clamp shown is made of the best malleable iron and is adjustable to different-sized flasks, thus obviating the necessity of the many sizes required in the old style and doing away with all blocking. By driving the iron wedge in, after having set the clamp up as firmly as possible with the lever, it will grip the flask much more tightly than the common clamp, and will always be square with the flask, as no wedges are driven under the ends and the clamp thus shifted.

The iron wedge which performs important functions is shown at the center of the clamp and has ribs on the sides next to flask that engage ratchet in clamp and serve to tighten it.

The adjustable bridge holders do away with all staples or the necessity of using extra clamps, and may be removed when not in use.



THE ADRIANSE ADJUSTABLE CLAMP.

The clamp is so constructed that none of the parts are detachable except the hand levers, one lever being sufficient for several clamps, and therefore the parts cannot drop out and get lost.

It is not only a good molders' clamp, but may be used in any place where a clamp is needed, and is much more quickly adjusted than those operated by a screw.

To readily move the rack out or in the wedge should be pulled out and the clamp held so that the wedge hangs down, thus preventing it from engaging the rack and to place it on a flask the wedge should first be pulled out and the jaws of the clamp adjusted to the sides of the flask, the wedge then inserted again and tightened by driving in or use of hand lever, but no lever should be used except when it is necessary to clamp very tightly. To remove the clamp it is necessary to knock out the wedge.

The adjustable bridge holder is used to hold bars or bridges where bars are weak or chaplets require holding down.

In order to work it easily, put the lever or handle and pinion in boxes with right hand and press down, at the same time slide in iron wedge with left hand.

Mr. Lyne Adrianse, of Grand Rapids, Mich., is the inventor and manufacturer, and will furnish further information upon application.

Charging Cupolas.

E. GRINDROD.

As I mentioned in my article in the April number of the Foundry that the cupola had less attention paid to it than the circumstances generally required, I will now give a good practice in cupola charging, showing the attention required in good even melting. The cupola will melt the same one day as another, providing the conditions are the same, and the secret of successful cupola management is to make the conditions as nearly alike as can possibly be done by mixing heavy and light irons so that they will be nearly the same for one day as another, not by picking out all the small iron first and leaving the heavy pieces to accumulate until all the small scrap is gone and then being compelled to use the heavy scrap all at once, so that any one not thoroughly up in the cupola business may have trouble in melting iron. In charging a cupola it is very necessary that the proper amount of kindling wood and heavy wood be used to get the coke burning briskly, and the cupola tender should not put on too much coke at the start, but keep adding the bed coke as the cupola burns through, keeping enough coke back to level up the bed before charging. Another important factor in cupola practice is that the bed coke and the first two charges ought to be picked coke; that is, no small coke should be charged until the third charge. This keeps the tuyeres clean by keeping the melting point a sufficient height above the tuyeres that no pieces of iron can get down to them before being thoroughly melted. This reminds me of a circumstance that came under my observation a few years back, and which shows the wisdom of Mr. Hansen's article in the April number of the Foundry, "Does the Blast Meter Tell the Truth?" We had at the time in the shop that I was working in a 40-second inside-lined cupola and a No. 8 Sturtevant blower. We had tried to take off a heat every day for six days, and did not succeed in getting poured from one ton to thirty hundredweight at any one of the six heats. The foreman said they could not get enough wind. Just fancy! On the sixth day the superintendent asked me (I was a stranger at the time) what I supposed was the matter. I told him that he did not have fuel enough on his bed, and that he was blowing on iron instead of coke. He simply laughed at me and walked away, and at this time they would throw off the governor belt and let the engine blaze away as fast as it could run. Now, if we had owned a blast meter at this time, it certainly would have shown a great pressure, but the wind was doing no good. You can put me down as being in full sympathy with Mr. Hansen in saying the cupola should be consulted before the meter. It is a very good plan to make the first charge of iron light iron, if it can be done, as this puts no heavy strain on the bed, but keeps it in good condition for the heavier charges. I do not think it is good practice to melt any more iron on the bed than on the other charges, and I always make it a point to melt light iron on the last charge, as it makes clean and quick melting. Now, in regard to the iron to be charged, the scrap should be assorted, the heavy chunks placed in the middle of the cupola, and should never be put on before the third charge and never

on the last. It should lay with the foreman to say how many chunks he can carry successfully in a charge, and by way of experiment he must be sure he does not put on too many at first, but feel his way by starting with a little, and, if his cupola melts even, to increase them until he can tell just about what his cupola will melt successfully. Another important point is having your charges level. There should be in every charge enough small iron to fill up all holes, for close charging, I claim, is economy in time and fuel, and while some advocate open charging, I find it to be wasteful in fuel and the melting is not even. If the above points are followed, I am satisfied no person need have any trouble about melting iron even, hot, quick and economically.

Cupola Practice.

H. M. RAMP.

PART I.

The April issue of THE FOUNDRY was conspicuous as containing four separate articles on the always interesting subject of cupolas, written by as many different men in widely separated sections of the country.

Cupola practice would appear to have spasmodic flashes of interest for a few months, and our trade journals refer to it quite extensively, and then for a time they relapse into a complete silence. A large variety of opinions and theories will be advanced, both of a practical and impractical nature, and often leave us as much at sea as it did at the beginning.

The writer desires to contribute his opinion and experience to the present fluctuation in favor of cupola literature, and in pursuance of that object would endeavor to show the practical side of the business.

The foregoing articles in the April issue will be touched upon to illustrate the writer's opinion, but not with the desire to criticise or belittle the successful performance of other men. It is often referred to, and a well-known fact that this portion of the business is surrounded by much superstition and ignorance. Nothing is more common than to see a cupola, and sometimes a set of cupolas, in which a large amount of iron is melted, placed in charge of some ignorant or incompetent cupola tender, who does not possess any information whatever concerning the scientific side of melting iron, but merely follows the formula laid down by the foundry foreman in a mechanical, unreasoning way. Probably this foreman is one who has little actual knowledge of this part of the business, who seldom studies it, gives his orders in accordance with some tradition or follows out some ancient plan or system, and when the iron does not melt properly or well, ascribes all the blame to the cupola, blower, engineer, coke, or anything but the possible lack of brains or attention. Again many engineers or foremen do not know how their cupola is run, no results are furnished or records kept, and only the bill for material purchased tells how much has been consumed. Many employers, if asked the question, could not reply intelligently as to the ratio of fuel to iron they are using, or the capacity of their cupola per hour, or whether they are getting the very best results possible as far as time and quality of iron melted are concerned. Indiscriminate charging is the common failing, especially in small foundries, where iron and coke are used regardless of any system and with the sole purpose of securing hot iron. Coke is shoveled into the cupola by guesswork or some kind of measure, and the amount of iron put into each charge is simply guessed at. This may be a satisfactory method to some employers who do not run large heats, and are only interested in procuring hot iron; but it certainly is not an economical one. To conquer these shortcomings and get the best results the most essential articles required are brains and system, the very idea that Mr. Groves brings out in the first part of his article. Procure a man for your cupola tender who possesses some natural ability, then educate him thoroughly upon the principles involved in his work, insisting always that everything should be done in a neat and systematic manner.

Mr. Keep in his article in the March issue of THE FOUNDRY brings out this idea in excellent shape when he speaks of the good results obtained by cupola experts and cupolas patented and run in accordance with the rules sent out with it, containing the results and experience of intelligent, observing men. Any ambitious cupola man, even if he has had no previous experience, can, by carefully watching the results obtained from his own work and inquiring around concerning the practice in other foundries, gather together

a fund of knowledge that would be invaluable to his employer. We see old-style cupolas and ordinary tuyeres doing splendid work, while others again, supposed to possess all the modern improvements and covered with a string of patents, are rank failures, or vice versa; but behind it all the hand that manipulates, the brains that plan and guide, are more essential to successful operation than any other consideration. Nowhere is Emerson's expression that "Matter is subject to mind" so appropriate as in the foundry. This is not intended at all as a reflection upon improved cupolas or methods of melting; but the thought intended is that improved cupolas or methods of melting are the results of brains and subject thereto, hence must not be compared to the source from which they spring.

To build and operate a cupola properly is a plain and simple process, and should be treated in such a manner. It is not necessary that the operator be a chemist and possess a knowedge of the oxides and gases to melt iron cheaply and well. It is not necessary that he should confine himself to any particular set of rules as to manipulation or construction; but it is necessary that he should understand the reason for everything he does or results secured. He may not be informed of the point made by chemists that too much fuel or too little blast produce as a result of combustion what is known as "carbon monoxide, while the proper proportion would produce carbon deoxide, which develops about three times as much heat units," but nevertheless, he can arrive at the same result by carefully observing the working of his cupola each day and putting the knowledge he thus acquires to some use.

Mr. Groves, in Part 3 of "How I Improved a Foundry," in the April issue, treats partly of the first point necessary for good cupola construction—namely, formation of lining—and shows how he had obtained good results, as many others did with similar devices. His method of contracting a cupola above the tuyere has one particular good feature—it reduces the wear on the lining to a remarkable extent, but from actual experience, both with and without this same design, it is not a benefit as regards saving of fuel, and detracts from the time of melting, for the reason that the contraction at that point robs the cupola of so much melting area. A perfectly straight cupola will melt faster than one designed upon this plan, although the wear on the lining would be much more severe.

Mr. Groves quotes Mr. Keep in reference to this matter, but it seems to the writer as if the natural wear of a cupola would be to wear it out larger direct above the tuyere, provided that the accumulation gathered each day from the dripping of the iron and cooling thereof is properly cleaned out as it should be. The cupola would then form a shape something like a huge lamp chimney.

This appears to be nearer the natural lines a cupola will wear to than any other, and any cupola works better and more successfully when permitted to form its own lines of formation by wear, but not by accumulation.

It has also been ascertained that cupolas built and lined in this manner will give better satisfaction as regards all the requisite qualifications, time, economy and wear, when properly manipulated, than any form known. It increases the melting area, permits a more thorough circulation of the blast, protects the lining, and always drops well. Practically it makes a larger cupola from a small one. The style of tuyeres shown by Mr. Groves are unique and supported by some logic. However, it appears as the cupola area increases nearer the side, it would be desirable to throw the greatest amount of blast there, and the smallest amount to the center, upon which basis, and the one that is supported, the tuyeres should be turned the other way with the flat side up. The style of tuyeres should vary, like other foundry equipment in this land of ours. Flat, square, oblong, triangular and round can all be found in model cupolas, and ones that are doing good and satisfactory work. We also have the center blast, the Blakeney cupola, with tuyeres all the way around, and numberless other devices that show excellent results. But, apparently, the vital point here is to furnish enough blast area, properly distributed, so the fuel will be fed in proper proportion to produce the best possible combustion, and the formation or shape of the same is of minor significance as long as this is observed. However, a round one possesses this advantage. It contains the greatest area for the amount of friction involved, and for that reason alone could be called the

best. But there is also another point in its favor. The round tuyere will carry a volume farther than any other style. Was the nozzle of a hose ever made square, triangular or flat, when it was desirable to force water any distance?

The old question of cold centers in the cupola, and the efforts and devices made to overcome the same, are often remarkable, for with rare exceptions there is no such thing possible as a cold center. Who ever saw or could certify that such a condition existed? A few simple experiments would convince the most skeptical that any ordinary cupola will carry its blast to the center easily, if supplied in sufficient volume, regardless of pressure, unless the same be very low—assume below eight ounces. When such a condition does occur it is due to the fact that insufficient volume of air is admitted at the tuyeres, of which the oxygen is entirely consumed before reaching the center, and leaves the fire there with little support. But even this condition is rare.

To be continued.

The New Foundry of the P. H. & F. M. Roots Co.

There is one concern located in Indiana that would seem to be doing a fairly good business, notwithstanding the hard times, judging from some recent enlargements and improvements.

We refer to the well-known P. H. & F. M. Roots Company.

Our two illustrations, showing north and south ends, were taken from almost the same spot in the center of their new foundry, which is 200 feet long and 50 feet wide. There are two cupolas, one 42 inches inside diameter and the other 36 inches.

NEW FOUNDRY OF THE P. H. & F. M. ROOTS CO. (LOOKING NORTH.)

Both are connected to one of their No. 5 blowers with engine on same bed plate, and can be operated separately or together, as the case demands.

The shop is also exceedingly well equipped with an overhanging system of hoists, consisting of a series of heavy iron tracks, two down the center of the shop securely fastened to the roof and one on each side.

This does away entirely with any cranes to take up floor space.

The center space is equipped with a pneumatic hoist of six tons capacity, and the side spaces have a hoist of five tons capacity.

This arrangement was entirely furnished and installed by the Whiting Foundry Equipment Company, of Harvey, Ill., and represents as complete and perfect working piece of work as could be imagined.

The Root Company are also erecting a machine shop that is expected to be unusually well equipped and convenient. It will, among other features, have a ten-ton electric crane.

NEW FOUNDRY OF THE P. H. & F. M. ROOTS CO. LOOKING SOUTH.

Aluminum Bronze and its Uses in the Arts.

The aluminum bronzes are the alloys of aluminum and copper, in which the amount of copper considerably exceeds that of the aluminum. Aluminum containing small quantities of copper is not designated as aluminum bronze. Copper containing from 13 to 90 per cent of aluminum is brittle, and at present has no use in the arts. The useful bronzes are those containing from one to twelve parts of aluminum.

Although aluminum bronze was discovered by the late John Percy almost forty years ago and its valuable qualities fully appreciated, its use in the arts was retarded by the continued high price of aluminum. It was not until the discovery of cheaper

methods of aluminum production that the bronzes received commercial attention. When, however, with cheaper aluminum, a demand for them was created, difficulties in manipulation arose which again retarded their use. Such technical obstacles become apparent only when alloys or metals are made upon a commercial scale; they are seldom realized in the experimental stage. The difficulties encountered were the rapid oxidation of the melted metal, the abnormal shrinkage, and the formation of blowholes. The shrinkage can be overcome by suitable risers, the blowholes by not overheating the metal, but the formation of oxide is the greatest obstacle now encountered. Whenever the melted aluminum bronze is brought in contact with the air or substances containing oxygen, it becomes covered with a thin film of oxide which is very liable to get into the casting. In many cases the oxide is imperceptible, but in others, such as large, flat pieces, where the exposed surface is considerable, the oxide is formed in large amounts, greatly deteriorating the casting both commercially and in strength. The manipulation of the alloy is so difficult that the art has not yet arrived at a state comparable with brass or ordinary bronze.

The value of the aluminum bronzes lies in their non-corrosive properties and great strength. In the former, they nearly rival the noble metals; in the latter they surpass iron and compare favorably with steel. The non-corrosive property is not confined to any particular mixture, but characterizes all the alloys; this property is undoubtedly due to the minute film of oxide of aluminum, which is formed on the surface of the metal when exposed to the air; the film is imperceptible, but undoubtedly imparts the quality of resisting corrosion.

The best aluminum bronzes are free from impurities; those containing impurities in the form of silicon and iron tarnish more easily than the pure bronze. Silicon is especially harmful, as it produces a black coating on the bronze when exposed to the air for a short time.

A very valuable feature of the bronzes is their freedom from the formation of green copper compounds, such as are found upon the brass alloys exposed to the elements. Aluminum bronze will tarnish, but only as a superficial coating, closely resembling silver in this respect. The discoloration can be as easily removed from the bronze as from silver. Tableware made from sheet aluminum bronze is now upon the market; it is unquestionably the nearest approach to gold known. No metallic taste, such as is found in German silver or brass, can be perceived when used, and the same care taken with it as is exercised with silver will keep it in excellent condition.

Aluminum and copper have great affinity for one another and unite in all proportions. When aluminum is added to molten copper, and the mixture stirred thoroughly, the temperature of the alloy rises immediately to incandescence, even though the copper may be just barely melted and the aluminum cold. This rise in temperature is not due to the action of the aluminum on the dissolved gases of the copper alone, as identically the same thing occurs when aluminum is added to molten aluminum bronze. There is no tendency in the combination of aluminum and copper to form definite alloys, or for either constituent to liquate.

The theory has been advanced by some writers that the metals unite in chemical proportions, forming the so-called aluminides of copper. The writer has never been able to detect any more homogeneity in one percentage of aluminum bronze than another. Like all alloys or metals, the bronze will swell up under favorable conditions on account of the liberation of occluded gases, but the portions which oozed out of the top of the casting or ingot, gave on analysis the same proportions of constituents as the main body of the metal. The aluminum bronzes are free from segregation and crystalization, so detrimental to the sand castings of alloys containing a large amount of zinc.

For resistance to corrosion aluminum bronze is peculiarly adapted, and is used in marine and acid work where ordinary metals and alloys are rapidly destroyed. Taking into consideration its strength, this alloy can be used to replace steel or iron in such places. For the replacement of steel or iron in ordinary work, where strength alone is the main consideration, aluminum bronze cannot compete on account of the price, but where both the properties of strength and non-corrosiveness are necessary, the bronze is of great value; it is without doubt the most reliable alloy for such purposes known.

Aluminum bronze is sold in the form of castings, forging, sheet, rod and wire. Tubes have not yet been placed upon the market, as the state of the art is such that no satisfactory method of producing them is known.

A seamless tube made of aluminum bronze would certainly find ready sale, as it would combine the two qualities so necessary in the successful application of tubing in high pressure steam and corrosive marine work.

Castings of aluminum bronze are made like iron, in green sand. The film of oxide covering the outside of the melted metal does not flux with the sand, and consequently the castings are as clean as if cast in a metal mold.

Castings are used for parts of torpedoes, water and gas meters, valves and valve parts, gears, worms and wormwheels, digester fittings of all kinds, parts of rock drills, parts of gas engines and rifles, and all classes of work requiring the qualities before mentioned.

All the useful aluminum bronzes will roll and forge hot if sufficiently pure. Rods and bolts are made in the same manner as steel, by rolling from the usual size billet. The fracture of forgings and rod is as close and fine grained as that of tool steel.

The United States Government have adopted aluminum bronze bolts for the foundation of the mortar batteries now being placed along the coast. The bolts weigh about 50 pounds each. They will not only obviate ali danger of corrosion, but have the tensile strength of steel.

Aluminum bronze is by far the safest copper alloy to forge, as it is like pure copper and can be forged either at a red or black heat, and no especial care need be taken except to prevent overheating. With the alloys high in zinc, great care is necessary to forge only at a red heat; at a black heat they crumble. Sheet is made by hot rolling cakes or slabs in the same manner as pure copper. If extra hardness and fine finish is desired it is afterward cold rolled. One noticeable feature of aluminum bronze is its rapid hardening by cold working. It, therefore, requires very frequent annealing.

Aluminum bronze sheet is remarkable for its toughness, and will allow repeated bending, which brass or German silver would not stand. A good example of this kind is the satisfactory use of strip aluminum bronze for sash tape, where all other non-corrosive metals are not sufficiently strong, or soon crystalize. Aluminum bronze sheet is used for screen plates, cartridge shells, spoons and forks, burners for vapor stoves, parts of fire extinguishers, varnish kettles, and for a large number of purposes too numerous to mention.

Wire is manufactured by the same process as copper, by drawing through dies, a rod previously rolled from a billet. Only the lower percentages are used, as even then they harden so quickly as to tear out the die unless frequently annealed.

The tensile strength of aluminum bronze has been considerably overestimated. The early tests were made with impure metal, containing large quantities of iron, silicon and other elements, which, although increasing the tensile strength, wholly unfit it for castings, sheet, rod or wire.

The following data give the strength of bronze as now sold, and consisting of the purest possible material:

Castings in sand, T. S.—
60,000 to 65,000 lbs. per sq. in. 20% elong
Rod, T. S.—
75,000 to 80,000 lbs. per sq. in. 40% elong
Sheet (hard rolled), T. S.—
90,000 to 100,000 lbs. per sq. in. 10% elong
Wire (hard drawn), T. S.—
140,000 to 150,000 lbs. per sq. in. 5% elong

The shrinkage of aluminum bronze is abnormally large, being from 5-16 of an inch to a foot, necessitating very large risers to keep the casting perfect. This fact renders the expense of making aluminum bronze castings considerable, as the labor of molding and finishing is greatly increased thereby. In ordinary metals no such risers are necessary. Aluminum bronze is dissolved readily by nitric acid, while sulphuric and hydrochloric have only a slight action. Potash or soda dissolve the aluminum and leave a reddish coating of copper on the outside of the alloy.

For resistance to sea water the following experiment, made by W. R. Webster, Jr., is of importance: Fifty grains of sheet aluminum bronze and fifty grains of pure sheet copper were immersed for four months in sea water, and were then weighed. The aluminum bronze lost .0340 grains and the copper .0900 grains, showing aluminum bronze to be about three times as non-cor-

rosive as the best copper under like conditions.

The method of working aluminum bronze is the same as that of other metals. It can be annealed by heating it to a red heat and either allowing it to cool slowly or plunging it in water. Both methods soften it. It is not hardened by slow cooling.

For soldering a little more difficulty will be experienced than with brass or copper, but not as much as with pure aluminum. Chloride of zinc should be used as a flux, and a solder high in tin should be used. It can be brazed with brazing solder, using borax as a flux. The specific gravity of aluminum bronze castings is about 7.5. The difference between the amount and the specific gravity of steel or iron is so slight that no advantage is gained in this respect, as is the case with aluminum.

As for the anti-frictional qualities of aluminum bronze, the wrong impression seems to prevail, as practical experience has shown that it is not suited for such work. While being strong enough to bear the strain, it readily heats and tears out.

Neither is aluminum bronze suited for bells, as often stated. No alloy having the qualities of aluminum bronze can be adapted to such a purpose. It is, as far as anti-frictional and sonorous qualities are concerned, like wrought iron or low carbon steel. The fusibility of aluminum bronze is a little higher than brass. It melts easily at a bright red heat, and, unlike most alloys, passes from the liquid to the solid state without having the intermediate pasty condition. It can be melted in either crucibles, or a reverberatory furnace, but, like all copper alloys, cannot be melted in a cupola without deteriorating the quality of the castings.

The color of aluminum bronze varies with the content of aluminum. Unfortunately, the alloy having the finest color is too soft for castings, but answers perfectly for sheet and wire. Any hardening material destroys the color.

The price of aluminum bronze varies with that of the constituent metals. The labor in casting, rolling, or drawing is so much greater than with brass or copper, that the cost of this item is increased proportionately. If aluminum should become as cheap as zinc, the bronze could not be made at a price comparable with brass. The field for aluminum bronze is not, therefore, for competition with brass in price, but to put upon the market a material having qualities which no other alloy possesses. The consumption of aluminum bronze will increase as the price of pure aluminum decreases.—Aluminum World.

Pokey's Pointers,

Did you ever notice how easy it seems to run some other man's business or do some other fellow's work? It is a bad habit to get this feeling, yet the idea is very prevalent that we are placed in the wrong positions on this earth, and there are few of us but what would welcome a transfer to some other line of industrial pursuit, where the working hours were shorter and the remuneration larger. The greatest trick in any trade is no trick at all; it is simply to tend to your own business and steer clear of all others. Many a foundryman has been successful in running a foundry, but when he branched out and began to build engines, nickel-in-the-slot machines or dishwashers, the foundry passed its dividend-paying ability. The shoemaker who should attempt to run a grocery store would certainly not make much out of his shoe business. The cause of many failures lies in man's inclination to spread himself over too much ground, when his attention, like a small blanket, refuses to go far enough around. The reason we have so many hungry-looking foundrymen throughout the country is because they operate the foundry as a side line, and it pays accordingly.

Pokey was buzzing around the other morning as if he wanted to find something wrong some place and didn't know just where to locate it. Though when a man is looking for trouble he is generally accommodated. Getting a glimpse of Tom lecturing a molder for attempting to cut out a set of bars with a shovel he made a bee line for him and in a sort of surprising way asked: "What is the matter with English Joe to-day that he ain't working? I thought it was understood between you and me the last time he got laid off that he was to get no more chances to cut up monkey shines around here. In fact, if I remember right, I didn't want him to have a job any more."

"Well," said Tom, as he fired a chew of tobacco at the cupola, "it is easy enough to

say that we won't give this man and that man a job again, but when I need men I am going to take the best I can get. I ain't going to cut my nose off to spite my face. As for Joe, he seems to have taken a pointer since I put him to work the last time, for he has been here every day and has done well, too. There he is on the other side of the traveler working on the condenser for the Johnsons."

"I seen him sitting there, Tom. But he ain't working, is he?"

"Certainly he is. What makes you think otherwise?"

"He is, is he? The devil you say, Tom. I am sorry to contradict, Tom, but Joe ain't doing a darned thing—hasn't been for the last half hour while I have been around. I us to wait for him, as there was very little seen one of those facing men around here this morning. He must have treated you to something that makes your eyes see things in a different light from what I do. There is Joe sitting on the edge of the flask. Do you call that working?"

"Every man that is standing still is not necessarily killing time, Mr. Pokey. Joe is just now engaged in making molders. You see those two young fellows working like longshoremen?"

"I see them, Tom, and ain't it a shame to let them work like that and let that lazy Joe just rest his bones there and not do a blessed thing?"

"I told you Joe was working. He is watching those boys."

"Watching them, is he? Well, Tom, if the boys can't work without somebody got to stand guard over them, you had better let them go. I don't think it is a paying policy to put a three-dollar man to watch two cheap boys."

"I put them on at your own suggestion. The molders ain't going to live forever, if they are a tough set."

"Let somebody else make them, Tom. It won't do to sink our profits in making them."

"Look here," said Tom, as he began to get red in the face. "Those two boys are doing work enough to pay Joe for looking after them. You are possessed of that antediluvian idea that a man ought to do a full day's work and teach a boy besides. Most boys are willing to work and only want a chance to, and Joe is letting them spread themselves. Joe will coax them and cuss them and make them work like he wanted to go to their funeral next week; won't do a bit himself, but just show them how; and after all, there is no man the boys like better, because there is nothing too good about a job for a boy to do when he is working with Joe; he fills them right up with confidence. Now, there is Billy Bump over there. He is different. Watch him flying around himself and see that disgruntled look in the face of the boy helping him. He just lets a boy do all the dirty work, and when that is done he can stand idle and feel around for the place where his liver is located. Some boys get lazy in a foundry, and as a rule they are made that way, when they can't touch anything without being growled at. Billy Bump is the kind of a fellow to make them. It ain't right to make a boy turn the crank all the time. Give him a chance to bear down, like English Joe is doing."

"I don't like to see him standing around as if he owned the place. Now, what good is it to train boys, when they only leave you, anyhow, Tom? Here we went and gave Brown's boy the best show on earth that anyone could wish for, and what did he do when his time was out but go over to the Enterprise and has been there ever since. Too bad he couldn't see what we done for him."

"Yes, and too bad somebody else should offer him more money," said Tom, with an accent that seemed to jar Pokey's ribs. "I always thought it peculiar that he should be worth more to the Enterprise than to us."

"Coming back at me again, aint you, Tom? I guess I had better be going."

"No, I ain't. Didn't that boy pick up things about as fast as any lad you ever saw?"

"I should say he did," assented Pokey.

"Don't you think he was worth more for doing so?"

"What, Tom? Worth more for picking up things, when we placed them right before his eyes and gave him all the chances in the world to take them along. Do you mean to say that he should have been paid extra for this?"

"I think he ought to be."

"Well, I will be chucked into perdition," remarked the pious Pokey. "That must be one of your modern theories, Tom. To think that you want to pay a boy for being smart."

"Certainly. Here was Baker, started in at the same time as young Brown, wasn't

worth three hurrahs in hell when he got through, and still he got the same pay. Which one earned the most money?"

"That is different, Tom. You see what we made on one was lost on the other."

"And why should the good suffer for the bad? Why not make some civil service reform?"

"Go slow, Tom. Reforms are a nasty thing to handle. Try it, if you want to, but look out for quicksand."

Obituary.

B. S. Benson, one of the oldest foundrymen in Baltimore, Md., died there Sept. 8th.

J. F. Halloway, one of the best known and best loved of American mechanics, died at the old Halloway homestead at Cuyahoga Falls, O., August 22d last. He was for twenty-five years connected with the Cuyahoga Ship Building Company, of Cleveland, O., and for fifteen years was its President and Superintendent prior to its purchase by the Cleveland Ship Building Co. Recently he was connected with the Henry R. Worthington Company, of New York, and the Snow Steam Pump Company, of Buffalo. He always took a great interest in foundry matters and his taking off will be mourned for a long time by a very large number of friends.

M. Henry Rennyson, a prominent foundryman of New Orleans, died at his home in that city August 5th. He was born in Ireland and was but an infant when brought to America. He learned his trade in New Jersey, drifted to New Orleans, where for over forty years he was Superintendent of the works of Leeds & Company, one of the oldest foundries in America. When this firm failed a few years ago he was made one of the receivers, and later on when the works were sold to Moses Schwartz he was made manager of the plant, which position he held at the time of his death.

Fire Fiend.

The Chandierre foundry at Ottawa, Ont., has been burned down, but will be re-built.

Reynolds & Land, Ithaca, N. Y., suffered from a $2,500 fire September 2.

On September 2 the large plow and implement foundry of S. R. White & Bro. at Norfolk, Va., was burned.

Otis Brothers & Co. are rebuilding their foundry destroyed by fire a few weeks ago at Yonkers, N. Y.

Fire destroyed the foundry of the Martin Morrison Company at East Omaha, September 4. Loss $2,000.

McFarlane & Co.'s foundry in Denver, Colo., had a severe fire August 16. Loss $1,000.

The Schwartz Foundry Company, formerly the Leeds foundry, New Orleans, are making extensive improvements.

The Gobeille Co. Again.

One would almost think that the field of originality in the matter of advertising had been thoroughly exhausted, but we are inclined to think that as long as the Gobeille Pattern Company are in the pattern business, the trade will constantly be getting something new.

Their latest is a small wooden box containing a few lozenges all stamped with that figure of the owl that has become a sort of trade mark with that concern. A printed sheet of directions contains among other wise expressions the following:

"If your patternmakers are twice as long on a job as necessary, take one lozenge.

If cost is 50 per cent. too high, take two; if 100 per cent take three lozenges.

If you have to run your pattern shop overtime, take the entire remainder at one dose, etc."

Know a Good Thing when They See It.

Just as an evidence of how some foundrymen regard the present pig iron situation we might mention the case of the Bridge & Beach Co., at St. Louis, Mo., who have taken advantage of the present prices to lay in a stock of over 6,000 tons.

If iron should suddenly spring upwards two or three dollars after election, as it is sure to do, someone would be making money.

The Moore-Holden Machine & Foundry Company will erect a foundry at Fort Worth, Texas.

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

THE FOUNDRY

Published Monthly by

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JOHN A. PENTON,

EDITOR AND PROPRIETOR.

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IF YOU FAIL to receive your paper promptly, please notify us.

THE FOUNDRY is issued promptly on the 20th. of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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Trade Outlook.

Well at this time of writing the business horizon is a little brighter.

This brightness is, however, confined strictly to the horizon and while this is not much, yet, considering the darkness and gloom of the past month or two, it may mean considerable.

There is a growing feeling of security and faith abroad that is most cheering and which we feel is not overestimated.

THE FOUNDRY, even at this early hour, feels like congratulating its entire constituency from the largest melters of iron to the humblest apprentice boy upon the prospect.

Free Silver is a captivating cry, and so was Free Trade, and it is just as much of a misnomer. Free Trade, or rather the very fear of it, resulted in no trade whatever and the election of Free Silver electors would result assuredly in much the same way. For months we would have a degree of business stagnation that would be unprecedented and it would be sure to finally end in the adoption of some compromise or half-way measure, alike unsatisfactory to all parties that after a very brief trial would be certain of repeal.

One most encouraging sign is the stiffening in the price of iron, which in many lines has advanced fifty cents a ton, and the withdrawal for the balance of this year from the market of some of the largest producers.

Just now, of course, a condition of affairs exists that we all realize too keenly and cannot be bettered by being enlarged upon.

In all lines business is particularly bad, with the jobbing foundries in a worse condition than the others.

There is likely to be considerable shutting down between now and election day, and the number of people idle now will be increased unless the certainty of the result is such as to leave little doubt as to the proper solution of this problem.

Scrap Heap.

These are trying times for the United States of America and the great majority of its inhabitants.

* * *

It is another case of "politics," which is one way of expressing a scramble between two or more sets of men and their respective parties and followers for office, power and lucrative positions.

Of course they all endeavor to make us believe that our future prosperity and salvation depends absolutely upon men holding their particular views being selected, and they warn us of the awful consequences that will follow if this advice is not followed absolutely.

* * *

Looked at in one way the certainty of some one being chosen to lead us into the Promised Land of Plenty ought to be encouraging, while again there is equal certainty that viewed from the standpoint of the opposition disaster is inevitable.

* * *

The misery comes from this glorious uncertainty and the fact that the fear of evil consequences has been the means of throwing a pall over our vigorous nation that we are all so proud of and that is causing untold anguish and leaving empty thousands of flour barrels.

* * *

The one consolation, as we pointed out last month, lies in the fact that our people are being educated in that best of all schools—experience—and the lesson learned is too emphatic to be easily forgotten.

* * *

But in a question like this, where the great body of the people find themselves divided suddenly into two parties, each taking a stand and advocating ideas and a policy that differs radically from the other, one must be right and the other wrong—yes, very wrong.

* * *

Those of our readers who have followed the policy of THE FOUNDRY in the past must know that we have carefully avoided taking strong ground on questions that might appear to be reasonably debatable and where men of ability seemed to consistently differ.

* * *

We do not believe that we are over-fearful, and while never enthusing very much over parties, platforms or candidates we yet feel that on this occasion, if never before, or never again, it is our duty to say to our readers that we hope for their sakes, as well as for our own, that the Free and Unlimited Coinage of Theories concerning our national finances will soon come to an end.

* * *

Further than this we are of the opinion that the fear of a radical change in our monetary system and the effect of that fear are responsible entirely for our present business depression and that just in proportion as this fear is relieved or banished, just so will business improve. This should have been, by rights, the banner year in our commercial history. Never before have we been blessed with such crops, never before has the earth given up to our use so bountifully of everything; we had no epidemics, wars or public calamities, and yet misery stalks everywhere through the land and our daily papers are filled with recitals of distress in every form from business failures to suicides.

* * *

Without entering at all into a discussion of details, THE FOUNDRY hopes for its own sake and for the sake of its friends, patrons and the country at large that no radical measures will be adopted to upset our present financial standards.

* * *

We honestly believe that such a fearful calamity will be averted and that the voters of the country will awake to a realization of these responsibilities before the ballots deciding the question are cast.

Krank's Korner.

At a recent meeting of the Western Foundrymen's Association Mr. Sorge found occasion to say that he considered it ordinary good foundry practice to melt eight pounds of iron with a pound of coke. Now, as it is difficult to find a foundry that is willing to own up to melting less than 10 to 1, and from that up to 15 to 1, it would at first sight appear as if Mr. Sorge had gone out of his way to hunt up some examples of poor melting, while the fact is that he comes closer to hitting the truth of actual ordinary foundry practice than men who are wont to argue on fuel economy, will be willing to admit.

In attempting to reduce the cost of production foundries have most savagely attacked fuel consumption. They have steered for this particular point as if it were the only

place in the foundry where economy could be effected, when a hundred others were just as much and more susceptible of being reformed. We don't want to say but that a great deal of good has resulted from this agitation and discussion of the fuel question, but we do believe that the existence of low fuel ratios has been somewhat exaggerated.

A low fuel ratio does not in itself imply that it results in economy. Some foundries have a serious discount to face on account of dull iron and would be practicing a better grade of economy by using enough more fuel to avoid this manufacture of scrap. And some of these very same shops are the ones who attempt to set the world's record for a melting ratio!

A foundry doing light work had purchased a very popular cupola, and understood from the outset that it would furnish them ten pounds of hot iron with a pound of coke. When it failed to do so the makers of the cupola were promptly notified of its misbehavior, and by return mail sent a package of testimonials and recommendations showing that their cupolas were actually performing such feats as advertised. One of these letters drew the writer's attention, because he had for some time worked in the shop and was familiar with its methods. The letter stated that the foundry in question was melting 11 to 1, and the writer does not discredit this performance, for during his stay there they were for the greatest part of the time unable to get iron hot enough to run a plate 24"x24"x½". This thickness is not considered very light nowadays, but it furnished a sort of fluidity strip, as Mr. West calls it. We could tell by this plate pretty nearly what kind of iron was on hand. This same shop used to stack its work in a circle, so that the jib crane could be swung around and pour it direct from the cupola. If they had to stop and rack the crane in the iron would set in the ladle.

Gentlemen, this is not melting iron. It is just thawing it out, and the weight that should be attached to a low fuel ratio in such cases ought not to be very heavy.

There is doubt as to the value of such a recommendation when the facts are known. As for its showing how much iron can be melted with the least fuel, there is about as much practical data obtained therefrom as from a speed trial of a government cruiser. They are both valueless for ordinary everyday work and have no relation to actual working.

Too many low fuel ratios are obtained by weighing a certain amount of coke and shoveling the balance in without weighing it. The portion that is weighed forms the ratio, while no account is taken of what is measured by the forkful. This is not exactly according to Hoyle, but it is one way of complying with the popular clamor for improvement. When a foreman finds himself unable to melt iron with the same amount of fuel as is credited to his neighbor, when the general manager keeps on asking pertinent questions, the foreman and cupola tender often hold a secret meeting and make a record for fuel economy (on paper) that is hard to beat. This sometimes accounts for short weight cars. You try to interview the cupola tender and you get the same satisfaction that an investigation committee would from cross-examining Pullman. We have never known a Paddy who would divulge any understanding between himself and his foreman. A cupola tender is as sensitive as any other mortal, and one thing he abhors is to hear complaints of dull iron. He will often on his own responsibility use more fuel than he is allowed to, making records that are the delight and pride of his employer. It is an easy thing to say that iron is hot enough to run stoveplate when there is no such work in the shop.

Local conditions should always enter into the consideration of the fuel problem. The class of work, the distance the metal must be carried, and length of time occupied in doing so are factors that should be taken into account in judging the merit of a melting ratio.

A little book-learning is sometimes a dangerous thing. We know of a foundryman who, on discovering that iron melted at a certain degree, that a pound of coke contained a certain number of heat units, and that so many of these heat units would raise the temperature of the iron so many degrees, proceeded to make life a burden for his foundry foreman by confronting him with figures enough to make a mathematician bald-headed. In practice, iron must always be melted at a considerable higher heat than the melting point. If such was not the case we would be unable to draw it from

the cupola. Iron begins to lose heat the very instant it leaves the melting zone. The lighter work we have, or the longer time the iron must be kept fluid, influences and governs the temperature to which it must be brought, so that the melting point is just something to figure on in theory, while the actual melting point we should know, and on which we ought to base our calculations as to the amount of heat obtained, is an uncertain quantity, but always above and in ordinary practice several hundred degrees above the theoretical melting point.

We believe that there are but few foundries who have a correct record of their fuel consumption, and that most of the shops with a ratio above 8 to 1 do some sleight-of-hand performance to obtain their figures.

Blighting a Richly Favored Country.

The following editorial, entitled "Blighting a Richly Favored Country," from a recent issue of the "Iron Age," forms one of the most graphically written pictures of what this country is now and should be that we have seen.

Let every reader of THE FOUNDRY study it closely. No one can deny that we ought to be enjoying in this country, with its unparalleled natural advantages, a commensurate amount of prosperity, while as a matter of fact there is proportionately more distress and a smaller volume of business being transacted than in many of those countries that we are sometimes prone to consider so much beneath us in many ways:

"The United States should be almost a paradise, when the exuberance of its natural resources and the perfection of its industrial development are considered. It is a country of enormous deposits of all useful minerals, as well as precious metals; it has great stretches of fertile soil capable of raising all the products peculiar to the temperate zone and some of the leading staples of the semi-tropics; and it is peopled by mixed nationalities of restless, aggressive, indefatigable workers who have tried to make every foot of it accessible to the influence of civilization and productive of wealth in some form. No other country on the face of the earth is so impartially favored with everything contributing to man's comfort and convenience, partly through the gifts of nature, and partly through the wonderful achievements of man. The goddess of plenty, to whose beneficence, prayers were regularly offered by ancient devotees, here reigns forever. Plenty of everything is found on all sides. Our farmers' granaries are full to bursting. Our cotton planters could almost supply the mills of the world. We raise enough food animals to feed whole countries besides our own. No workman in any clime was ever able to sit down to such a variety of food at such low cost as the American workman. All his other necessities and many luxuries are as abundantly, and in great measure as cheaply, supplied. Consider his condition in comparison with that of workingmen in many countries, where only the coarsest food is available, and then in stinted quantity, and where almost everything but the plainest articles is an unattainable luxury. With such abundance, with such comforts, our people should be the happiest on this planet. Yet by a strange perversion they are now among the most depressed. Sadness pervades many a household, and even despair has too often displaced happiness. The attack upon our currency system, which has created distrust everywhere and among all classes of people, has paralyzed credit and has thus restricted employment. And now the complaint is heard, we have too much of everything, too much corn, too much coal, too much iron ore, too much cotton, too many factories, and, of course, too many men. Demoralization rules because the currency chain has been broken whose links connect all industries, all occupations, all interests. In the midst of such bountiful stores of all products as the world has seldom witnessed in the possession of one nation, gaunt poverty stalks and fiendish starvation threatens. And those who have wrought this mischief are deluding themselves and others with the belief that through their theories only can we have better times!"

The Racine Malleable & Wrought Iron Company will erect a foundry in Racine, Wis.

The Portage Lake Foundry Company has been incorporated at Houghton, Mich. They have purchased the property of S. E. Cleaves & Son, at sheriff's sale for $53,000 and expect to operate it extensively.

CAST IRON NOTES.

Devoted to Inquiries from Practical Foundrymen on the subject of Melting and using Cast Iron. Address all Inquiries to W. J. KEEP, care of The Foundry.

CARBON IN CAST IRON—A correspondent writes: "Referring to your remarks in Cast Iron Notes in June, you speak of the difficulty in mixing iron by chemical analysis of silicon on account of the variation in carbon and because the percentage of silicon needed depends upon the percentage of carbon present.

"You also refer to the modern custom of running a furnace with hotter blast, and by draining the furnace often make the iron come faster and thereby diminish the amount of carbon. Do you not think that irons made in the manner referred to above, which come within the range of ordinary foundry irons, will take up in the process of melting in the cupola in contact with the fuel, all the carbon which they would naturally absorb? The iron descends in finely divided streams through fuel rich in carbon. It has been found that one per cent of carbon can be added to soft steel by the Darby process."

ANSWER—Iron ore is an oxide of iron. In the blast furnace the oxygen is removed and the remaining iron is melted. The process consists of charging into the furnace ore and fuel which descend together. At the lower end of the furnace hot air is blown in which burns the fuel near the point where it enters producing carbonic acid which ascending through the hot fuel higher up becomes carbonic oxide. This takes the oxygen from the ore, thus again becoming carbonic acid. After the ore is relieved of its oxygen it is iron in the form of a sponge exposing a very large surface to the action of gases. As it passes downward toward the hottest part of the furnace, where the air enters, through the portion where the gas is carbonic acid, the iron sponge absorbs carbon. The amount that will be absorbed is inversely as the speed at which the ore descends. The greater heat the more carbon will be absorbed. For an iron to be high in carbon the furnace must be hot and the iron sponge must remain in contact with the carbonic acid gas a sufficient length of time. The sponge does not absorb carbon by being in contact with fuel but by contact with the gas produced by the combustion of fuel. The more surface the greater the contact, therefore iron made from dense hard ore in large lumps will not contain as much carbon as when the same ore is broken very fine, or when a more open ore is used. After the sponge reaches a point where the heat is sufficient to melt it there will be no increase of carbon.

The iron that runs out of the furnace has absorbed as much carbon as it could hold. If the iron will be gray foundry when it is cold it is because it contains enough silicon to prevent the carbon from remaining in combination and to compel it to separate in the form of graphite.

Such iron is at such a high temperature in the furnace that it is able to hold more carbon in combination than it can when the temperature is lowered. As soon, therefore, as it leaves the furnace the surface of the flowing metal is covered with floating graphite ("kish"). More or less will rise on the surface of the pigs. When the pig becomes solid the graphite which separates is caught between the grains and gives the fracture its gray color. From the time the sponge iron was melted in the furnace until the pig is cold there is a constant loss of carbon. The slower it cooled the greater the loss. A cupola can never heat pig iron much above its melting point, and it can therefore never absorb more than it already has; and as a general thing it cannot reabsorb quite all of the graphite that has lodged among its own crystals. In the cupola the iron is not in a finely divided state when compared with the sponge iron of the furnace.

The iron in the furnace didn't absorb carbon while it was melting, and does not in the cupola. In the cupola the melted drops are not in contact with the fuel to any great extent and the passage into the hearth is very rapid. This is not similar to the Darby process which takes melted iron from which all carbon has been removed and which therefore has a very strong affinity for carbon. He adds finely powdered coke to such metal and it absorbs instantly one per cent of carbon. Iron in contact with powdered carbon at a temperature that will melt iron cannot absorb much more than 2 per cent of carbon. This is, therefore, the saturation of such iron with carbon at such a temperature, and if an iron containing more carbon

than 2 per cent is melted in contact with powdered carbon it could not absorb more. Iron to be fit for foundry purposes must contain more than this and generally contains about 3 per cent, and it rarely contains 4.50 per cent. Gray pig iron, therefore, loses carbon in being melted and cannot in any way be made to increase it.

I spoke of the irregularity of carbon in pig iron and said that a given percentage of silicon would not be as effective with low carbon as with high to show that controlling a foundry mixture by analysis of silicon would not give castings of uniform quality.

There is no way of varying the quality of the castings but by varying the chemical composition, but I believe that the measure of the shrinkage of a test bar or other examination of a casting is the only sure way to tell whether more or less silicon is needed, because such a measure takes into account the carbon and all conditions attending the melting of the iron. I would not advocate paying high prices for pig that contains a high percentage of carbon. Ordinary iron at low prices will make good castings. The founder can change the silicon so as to produce the quality desired.

Western Foundrymen's Association.

The regular meeting of the Western Foundrymen's Association was held Wednesday afternoon and evening, September 16, 1896, at the Great Northern Hotel, Chicago, Ill., the President, Mr. A. W. McArthur, in the chair.

The President announced that it had been decided to postpone the regular business of the Association until evening and to occupy the afternoon session with the reading of two papers on "Compressed Air."

Mr. Curtis W. Shields, of the Ingersoll-Sergeant Drill Co., New York read the paper on "Compressed Air and Its Economies in the Foundry," appearing on page 30.

The Secretary then read a paper by Mr. George A. True, of the Whiting Foundry Equipment Co., on "Compressed Air as a Hoisting Power in the Foundry," which will appear in our next issue.

The meeting then adjourned until the evening session.

At 7:30 p. m. the members and guests sat down to a banquet at the Great Northern Hotel, to which they did ample justice. When the coffee was served and cigars distributed the President called the meeting to order and welcomed the members and guests in a short speech. Mr. McArthur said:

Gentlemen and Members of the Western Foundrymen's Association: It gives me great pleasure in behalf of the Western Foundrymen's Association to welcome you who are our guests to-night, and to those who are members no welcome is needed. I think it is a very good thing to get together as we have done this evening. At our regular monthly meetings we confine ourselves so much to business that we have little opportunity to become acquainted with each other.

Several weeks since it became evident, by reason of local disturbance at Cleveland, that it would not be possible to hold our September meeting there this year, and we were disappointed. But, in view of the splendid papers that we have heard this afternoon and the proposed discussion thereon to-night, and in view of the excellent good cheer and good feeling that has existed at this board to-night, I do not think our September meeting has been a failure in any sense. I think it is a matter of satisfaction to the Association that, in these depressing times we should have such a generous attendance.

Again I bid you a very hearty welcome.

A. Sorge, Jr.: Gentlemen of the Western Foundrymen's Association, Mr. President and Our Honored Guests—I want to congratulate the Western Foundrymen's Association particularly upon the progress it has made within the last year and hope that the progress will continue in the same direction. The distinctly technical line which the Association has taken up has borne fruits, not only here but abroad. Among other things I wish to read two applications for membership in the Western Foundrymen's Association. One of them comes from Germany and is from Rudolph Bocking. I replied that we should be pleased to confer upon him the honor he desired and sent him an application blank to be filled out, which was duly returned to us.

Gentlemen, I think it is an honor for the Western Foundrymen's Association, and one that we may be justly proud of to get this acknowledgement from Germany. At the

meeting of the Board of Directors this afternoon this application was taken up and passed upon, and is hereby submitted to the members.

On the 29th of August I received an application for membership from Isaac G. Lester, Bengal India.

These two applications for membership are hereby submitted to the association for action.

Upon motion, duly seconded, the two applicants were granted membership in the Association.

Mr. McArthur: As the discussion of the papers of the afternoon will be lengthy, I think it will be advisable to take it up and, if there is time, take up the committee reports later.

Mr. Shields: I assure you I appreciate the honor that you do me this evening in inviting me here as your guest. I fail to find words in the English language to express my gratitude. When I realize that this is the Western Foundrymen's Association to which I have the pleasure and honor of speaking—the Western Foundrymen's Association, whose actions and deliberations and whose reputation have extended far beyond the seas, as evidenced by the letters read here this evening—I do not see what I am here for. I am not a foundryman; neither am I an after-dinner speaker like Chauncey Depew. I heard Mr. Depew make an after-dinner speech once. I was in an elevator with him just after he had dined one day, and as he wished to alight and I was in front of him he said: "Stand aside." I should like to make my after-dinner speech in the same way and stand aside for some of you.

I have been enabled to obtain some data and information on the subject of compressed air as applied to foundry practice. It is a subject in which I think all foundrymen are interested. The various manufacturing tools and air-using devices evidence the attention and brains that are being expended upon this power, from which we are expecting so much. Among the various air-using appliances that it has been my good fortune to observe and take data upon, perhaps the best known is the air-hoist. The paper presented by Mr. True gives more facts on the subject than I have seen before produced by anyone or anywhere. The facts as shown by his paper and by the few things I have been able to gather together, appeal directly to the pocket-books of the foundrymen, and I think that is the way to their hearts. A machine shop that is supposed to be up to date will expend thousands of dollars to cheapen by a few cents any of their output, while the foundrymen will get along as best they can with what they have. I have frequently heard it stated that "the foundrymen would do it in some way," which I consider a compliment to the foundryman. He generally does it in a good, respectable manner, else the man that bought the goods would not receive them.

The way that compressed air aids us is in its rapid way of turning out work, together with its advantage of cheapness in saving time and labor. An incident that is especially marked is a case at Massillon, O., where three hours per day were saved by the introduction of a single air-hoist on a floor where a workman and his helper were employed.

Mr. G. H. Carver: I would like to ask Mr. Shields how he arrived at the data of saving fuel. He states that he saves one per cent of fuel for every five degrees that the temperature of the air admitted into the cylinder is lowered.

Mr. Shields: That is quite an important point and one that interests all users of air. The authority for that statement is Mr. W. L. Saunders. He is the author of a great many articles on compressed air, and among them is a serial that is running in his paper, "Compressed Air." A great deal of this information was originally gotten up for a book, but since he determined to edit this paper, he is running these results in the shape of a continued article, and, while I do not know where and how he got them I am satisfied they are correct.

Mr. Wm. Ferguson: I should like to inquire if there is any one present who has any practical experience with sand-blast and also with the pneumatic chippers.

Mr. F. C. Patten: I can just say a word with reference to sand-blast. We put in sand-blast some time since and where before it took 8 or 9 men to clean our castings we have one man at $1.75 per day that does all the work and has a little time to spare.

Mr. Sorge: I would like to ask Mr. Herbert Arnison to give us some information as to the amount of power required and the

labor cost for cleaning a square foot of castings of various kinds, say light, medium and heavy. I should also like to ask the question as to the least intensity of blast admissible for cleaning castings.

Mr. Arnison: We run the whole of our machinery—no matter what the size—from approximately 10 pounds to 15 pounds pressure. That pressure is shown by a gauge situated on the outside of the blast apparatus. We do not run higher than 15 pounds. I only know of one concern in the country which has run higher than our specification in that regard. It is using machinery in cleaning bicycle frames. From 8 to 10 pounds is the least.

Mr. Sorge: Have you data from experiments that have been made at a lower pressure proving that the apparatus is not successful at the lower pressure?

Mr. Arnison: I will obtain such for my paper which I expect to present to this Association.

Mr. McArthur: I would like to ask Mr. Arnison as to whether or not the sand once used is capable of being used over again, or if not, what disposition can be made of it, and what figure does it cut in the operation of the plant?

Mr. Arnison: In cleaning dirty castings it is practically impossible to use the sand over again. It is just so much waste. Where the work is clean, that is to say, where ornamental castings are cleaned or prepared for various processes of nickeling, etc., it is probably advisable to use a clean sand, perhaps crushed quartz, and use it over and over again, which may be done. This quartz does not pulverize rapidly and it is cheaper in the end. The sea-sand found near Cape May is the ideal sand to use with sand-blast machinery.

Mr. McArthur: I suppose you can tell in your paper what amount of sand would be necessary to supply to the apparatus. I had in mind more particularly the cleaning of heavy castings in which surface is the desirable thing, and yet there is sufficient body of material to burn in the sand.

Mr. Sorge: I would further like to ask Mr. Arnison what the item of repairs would be and whether he can in his paper give us some data of the repairs that are likely to come up and the depreciation of the apparatus and the parts necessary to be replaced.

Mr. S. T. Johnston: Have any of you found any one using the sand over again for cores?

Mr. James Brady: The sand used in the sand-blast is of no earthly account to use in cores. I know of what I speak.

Mr. Shields: We use all our sand from our sand-blast for cores and mix it in the proportion of 1 to 4 with new sand. We should be glad to show anybody that is interested all about our sand-blast.

Mr. E. W. Smith: I think it would interest the smaller foundrymen if there would be some discussion as to the approximate cost of the air-compressor, that is the equipping of the plant. I have not heard anything on that point at all.

Mr. Shields: I would say that it is almost impossible to say just what the cost of the compressing plant would be, unless I knew the apparatus, number of hoists, etc., that you would propose to use. A small belt-driven compressor would cost from $175 to $200 and would run a number of hoists, enough hoists to pay for it inside of six months without any question.

Mr. Johnston: I think there is one danger in putting in the compressed air system, that is the danger of putting in a compressor that is too small. If you do not get power enough you cannot do the work. I know of several instances where they have bought the compressor first and then bought the hoists. We did the same thing, and are always getting a larger one and we will have to get a still larger one. There seems to be no end to the work that the compressor can be put to. It does not cost very much more to get a compressor that will do all the work you will want it to do than to get one that is a little too small.

Mr. McArthur: I would like to ask Mr. J. W. Rundle, of the Whiting Foundry Equipment Co., how is the leather packing affected by a five-ton ladle of hot iron?

Mr. Rundle: It does not seem to affect the packing. The moisture in the air seems to offset the heat from the ladle. I have seen a disk of iron put above the ladle and so protect the leather from the heat of the iron. In pouring off the casting the expansion of the air takes the ladle up.

Mr. Sorge: I have marked Mr. Shields' paper in several places and would like to ask him some questions which I think would be of interest to the Association:

The first is: "A deeper draft is possible using air than can be obtained with a steam actuated machine."

I should like to ask Mr. Shields to give us a little more detailed reason why the motive power of air would be more effective in permitting us to get a deeper draft than if we use steam or other power.

The second is: "The excess of 261.55, 573.9 and 654.87 pounds in the respective cases is, no doubt due to the fact that the chains are hugging the sheaves tighter under the loads than when empty, and this increased friction must be overcome at the expense of pressure."

Can Mr. Shields tell us how he figured out the amount of excess in these various cases, and can he tell us what the excess is in comparison with the various loads?

He further tells us that "The product of the molding machine can be greatly increased, if the handling of the sand in shovels is done away with. This is accomplished with an air jet....."

I would like to ask Mr. Shields whether he has figured this out for a thirty ton plant as spoken of in Mr. True's paper.

Mr. Shields: I shall have to call attention to the fact that I am only interested in the production and generation of compressed air. The data that I have presented upon the economy of air-tools have been derived simply by observation in various foundries. Whenever I have come across these doubtful questions I have applied to the manufacturers of the various devices.

In regard to the excess of pressure, I made my test in the foundry of Russel & Co., at Massillon, O. We had a gauge tapped in one of the cylinders of the hoist. I had one man stationed at the air-receiver in the foundry and I had another man with a six foot stick so that each hoist should be kept at the same hight. I found in making a 2,000 pound lift 30 pounds pressure was required on the gauge. When I came to figure my loss by friction I found I had an apparent discrepancy. I wrote to Mr. Heggem and asked him if he could help me solve the problem. He put the pressure on the piston without any load on the crane. He found ten pounds pressure was required to overcome the hugging of the sheaves and chains. In comparing the loads lifted and the power required to overcome the friction there was this discrepancy. The test was made on a loaded hoist and the determination was made in the other case on an empty hoist. The only explanation I have was the fact of the chains hugging the sheaves tighter because of the increased load.

At the Pullman shops they made some experiments with axles. They make 160 a day and they weigh about 600 pounds apiece. Each axle requires to be hoisted and lowered 8 times. In figuring the air required in handling these 160 axles 8 times, it was found to amount to seven and one-half cents a day. The actual cost of the air is the smallest item.

In regard to the statement, "A deeper draft is possible and, etc." My experience with molding machines has been limited to the Tabor molding machine entirely. Mr. Mumford has told me that air is much more desirable to use than steam, particularly with their new rapping devices. The rapper is a small body of metal, probably weighing two pounds, and gives a light blow. Simply a vibration of the rapper is produced and the pattern is taken away from the mold. The steam clogs up the cylinders of the machine and that is why you can get a better and deeper draft by using air. It is not a great trick, but simply a mechanical effect.

In regard to the handling of the sand overhead, the device spoken of was made by Mr. Henry C. Sergeant. It was made at the request of some friends of his who wanted to lift sand. They use it in a great variety of ways. In some cases the sand is put into an air-tight reservoir and at the bottom is an outlet pipe. The air pressure is let in at the top and sand forced out. The amount of air required to do this is really larger than and slightly out of proportion to the cost of operating other air-tools, because it is a straight blow through. While you can handle your sand to good advantage where you have a direct lift overhead and let the sand fall through a shaft, it is hardly fair to compare that with handling the sand for your entire foundry.

Mr. Sorge: I would like to explain why I asked the question about the deeper draft. Some four or five months ago I was consulted on the question and advised the use of the Tabor molding machine for molding certain articles. I suggested to the Tabor

people the use of air in their machine and they distinctly told me that they preferred to use steam at that time.

Mr. Shields: I can go a little further and say that within the past few weeks the Tabor people have designed and have now in the Patent Office a portable compressed-air molding-machine—that is, a machine which can be taken to any part of the foundry and the molds to cover that part of the floor can be made from this portable machine. It is cheaper to move the machine than to bring the tons of sand to the machine. This machine is not on the market and the patents have not yet been completed upon it. I simply have the advance notice of it. I expected to have drawings, photographs and data of this portable machine for this meeting, but as the patents have not yet been granted they are not in shape to lay the matter before the public. At the time Mr. Sorge spoke to them they were not in shape to say anything about the matter.

Upon motion duly seconded, the thanks of the Association were extended to Mr. Shields and Mr. True for their papers.

The meeting then adjourned.

Another Foundrymen's Association.

The latest city to organize a foundryman's association is Pittsburgh, where a number of the leading foundrymen have been quietly at work for some time perfecting all of the details.

The first meeting was held in that city on July 31st, at which time a committee was appointed to prepare the necessary By-Laws and Constitution.

The second meeting, where the work of organizing was completed, was held September 11th, at the Engineer Society's hall, where an association to be known as the Pittsburg Foundrymen's Association was formed.

Mr. Robert Taylor, of Taylor, Wilson & Company, was made President; Wm. Yagle, of Wm. Yagle & Company, Vice-President; J. D. Seaman, of Seaman & Sleeth, Treasurer, and F. H. Zimmers, of the Union Foundry & Machine Company, was made Secretary.

The Executive Committee consists of Henry C. Shaw, of the Lewis Foundry & Machine Co.; Wm. Yagle, of Wm. Yagle & Co.; H. M. Wilson, of Taylor, Wilson & Co.; Isaac W. Frank, of the Frank-Kneeland Machine Co., and Philip Mathes, of the Brittan, Graham & Mathes Co.

The Secretary writes us that those who have taken an interest in this move are enthusiastic over the outlook and intend doing all in their power to make it a great success.

Notice.

Advertisements entitled Situations Wanted, or Situations Vacant will be inserted in this column One Insertion FREE. All others, 25 cents per line.

WANTED—A position as brass foundry foreman; have had twelve years' experience as foreman and can give the best of references as to ability. Address box 14, care THE FOUNDRY.

WANTED—Foreman molder for radiator shop; must thoroughly understand his business. Address Holland Radiator Company, Bremen, Ind.

WANTED—By a first-class molder who has an interest in a foundry in Iowa, position in a good shop melting good iron and where he could get his own work done. Address box 32, care THE FOUNDRY.

WANTED—In a stove foundry, a melter. Give references, experience and wages required. Address box 31, care THE FOUNDRY.

WANTED—Practical foreman for iron foundry, who thoroughly understands moulding of hollowware and castings of similar nature. Address box 25, care THE FOUNDRY.

WANTED—To exchange good farm of 80 acres, 55 acres improved, 3 acres old orchard, good springs, with trout pond, situated in Isabella county, Mich., for iron working machinery, 36-inch iron planes, 24 lbs. shafting lathe. For particulars, apply to or address R. Lamb, Clare, Mich.

FOR SALE—One 6,000 capacity screw ladle, made by Obermayer & Co., been used about two dozen times and kept out of the weather. Address S. A. Denyer, box 158, Thibodeaux, La.

FOR SALE—No. 3 Root Blower, used only few months; to be replaced with largest size. Address box 4, care THE FOUNDRY.

FOR SALE—Cheap, one No. 2 Baker Blower; one No. 4 Baker Blower; one No. 5½ Baker Blower; one No. 7 Sturtevant Fan; one 3-ton Foundry Elevator, also several second-hand cupolas. Address J. W. Paxson & Company, Philadelphia, Pa.

Questions and Answers.

James A. Beckett, of Hoosick Falls, N. Y., writes in reply to the question in our July issue concerning match plates and patterns and a non-shrinking metal, as follows: "The best way to obviate the difficulty of shrinkage in making match plates, is to make the plates and patterns separately, have the patterns split on the parting line and put half of each pattern on each side of the plate. This way of making a match plate is the most expensive, but the cost of fitting up the patterns would be somewhat lessened if they were made of bronze. The plate to which they are attached should be made of iron. A match plate made in this way will prove the most satisfactory where uniformity and accuracy are desired. I know of no bronze that is free from shrinkage and the usual non-shrinking pattern compositions are unfit for match plate making.

In making the cheaper form of match plate, those in which the plate and patterns are cast in one piece, the only way to get rid of any of the shrinkage is to make them of iron of minimum shrinkage. Such an iron should contain 2.75 per cent silicon, about 1.00 per cent phosphorous, with sulphur as low as possible, and manganese about 0.500 per cent. For ordinary match plates such an iron should shrink very little, and should be strong enough to last well, soft enough to fit up readily, and can be easily obtained. Another way to avoid shrinkage with patterns of unequal surface, was illustrated by an old match plate which I saw the other day, which was made about 30 years ago and was in constant use for a number of years. In making it the iron patterns (mitre gears about 5 inches diameter) were rammed up in the mold and after the cope was lifted off the patterns were coated with some substance which prevented the iron from chilling when it ran over them. After the joint of the mold was built up so as to secure a plate of uniform thickness, it was closed and poured off with the patterns still in the mold. The iron from which it was made was of the character given above, and after the plate was cleaned up the patterns were fastened to it with screws. The castings made from this plate had to run at a high rate of speed, and the length of time it was in use, is proof that it must have given satisfaction.

For my own use I prefer a good iron pattern, whether on a match plate or for use by hand. I think that it is poor economy to make cheap, poorly fitted patterns when a uniform product is desired. There are enough uncertainties which are inseparable from a molder's work without increasing his difficulties, and consequently the cost of production, by compelling him to work with a poor pattern."

James Reynolds, of the James Reynolds Manufacturing Company, New Haven, Conn., who are extensive manufacturers of metal patterns, says in reply to same question: "In answer to inquiry in the July number of The Foundry, I would say that in my experience of fifty years as a brass molder and founder, the only way that I know of to avoid shrinkage in patterns is to have the original large enough to allow for shrinkage.

It is not true that bronze will not shrink. It will, so will all metals in the brass, bronze and composition lines. A certain class of white metal patterns can be made that will have little or no shrinkage, to a certain extent. I make a specialty of fine pattern castings, and I always make them of bronze, some harder than others, according to the usuage the patterns are to receive, etc.

E. C. Robinson, of Canandaigua, N. Y., writes in reply to "F. M. J." in the August issue as follows: "I would suggest that in the space where he now puts sand, that he uses pulverized charcoal that is thoroughly dry and if it was fired before using it would be still better, and as fast as the charcoal burns out replenish it with more and keep it burning until the wheel becomes black. The charcoal should be applied as soon as the chill can be removed, and before any shrinkage of the casting has taken place that would cause the cracks. The charcoal has the tendency to arrest the shrinkage of the iron and allow the hub and arms to shrink first, the trouble being that

the 'chilling' caused the rim to shrink faster than it would if poured against sand, the unequal cooling causing the cracks.

I would also suggest that charcoal pig be used in place of anthracite as I find that only charcoal iron can be relied upon in making chilled castings to get any special depth of chill that is desired."

David Spence, of Williamsport, Pa., writes as follows in answer to a question in a recent issue concerning the making of metal patterns:

"To overcome shrinkage in match plates I would say, if the patterns are small, make them out of a metal consisting of half block tin and half zinc, make the patterns in half pieces and match them on a steel plate. There is not any shrinkage in a metal made of tin and zinc if the patterns are small.

Good Melting.

Mr. Editor:

The writer has derived great pleasure from reading the articles on Foundry Practice and Management of Cupolas, published in "The Foundry," and takes the liberty of sending you the results of a few days' casts from our 42 inch cupola, which are as follows:

Date.	Fuel, lbs.	Iron, lbs.
Aug. 3	2,040	20,500
Aug. 4	2,250	22,000
Aug. 5	2,150	21,000
Aug. 6	2,110	22,500

You will see by the above that we get a good average of 10 to 1 in a cast of from ten to eleven tons; at present we are not running full on account of dull times, but if we were casting from this cupola say fourteen to fifteen tons per day, we could get 11 to 1, and that without any trouble, because the charges of fuel are small when compared with the charges of iron after the first bed has been laid.

Now the question may be raised as to the kind and quantity of fuel we use: Our bed consists of 900 pounds of furnace coal and first charge of iron 4,000 pounds, then 220 pounds of coke and 3,000 pounds of iron and so on until the last five charges, when we reduce the coke to 200 pounds, still retaining the 3,000 pounds of iron at each charge and as our work is mostly light castings—such as soil pipe and fittings and furnace work, the iron must of necessity be both fluid and hot, which we get every time.

The cupola has a wind box all around the shell, with six tuyeres, and from the bottom of tuyeres to sand bed measures 15 inches. Said tuyeres are widened on the inside of the cupola so as to extend the blast equally through the same. We also test four bars each day, of 1 inch by 1 inch by 12 inch centers, average breaking strain from 2,400 to 2,900 pounds, with 3-16 to ¼ inch deflection, this being good for our work.

We have not yet melted 14 to 1, nor do we expect to, at the same time we think 8 to 1 is very low. Perhaps some of your correspondents will kindly tell us through "The Foundry," the manner in which they charge their cupolas, and results of same, as the papers already published do not give sufficient detail for ordinary foundrymen to work from.

Yours respectfully,

JOSEPH BEST,

Superintendent Warden King & Son, Montreal, Canada.

Another Doubter.

Mr. Editor:

In looking through your issue of August, we find where Mr. Malpass replies to Mr. Portz, but he does not state what he thinks the proportion of iron to coke should be. However, he says enough to show that he does not believe Mr. Portz is correct, and the writer agrees with Mr. Malpass, and it is safe to say such a thing is impossible, and if Mr. Portz will stand by and see the amount of coke and iron weighed and put in, he will find that the thirteen pounds of iron to one pound of coke will stand a tremendous discount. If he does this, we would then like to hear from him through your valuable paper. Would also like for him to state if iron was good and hot, and if all scrap; if not, what proportion and what kind of coke used. This will show gross melt. Then to get actual melt, weigh the returns—castings, spines—retd melt which would consist of coke and iron dropped in bottom, and deduct this, and he will then get actual melt. Then be honest with himself and compare this and see what proportion the thirteen pounds to actual weight results. Very respectfully,

GEO. McKINLEY.

Concerning Proportion of Fuel to Size of Cupola.

Mr. Editor:

The April number of THE FOUNDRY contains an article on the management of cupolas by E. Grindrod.

He makes the statement that there is a direct proportion between the amount of fuel used by one cupola to that used by others, but he is wrong in figuring that it is in direct proportion to diameter.

The capacity of a cupola for melting is in proportion to the area of the square of the diameter. If a 30-inch cupola takes 450 pounds of coke on the bed, the 42-inch cupola should have 882 pounds of coke on the bed, and in place of 1,400 pounds of iron should have 1,960 pounds.

I have had twenty-five years' experience with cupolas and feel sure that I am right. I use a 22-inch cupola, with tuyere six inches from the bottom, and melting 2,500 pounds of coke.

One of the main causes of bad melting is owing to poor charging. Each charge of coke or iron should be put on so that it will be level; but carelessly piling it up on one side prevents the best results.

I have made castings up to 1,600 pounds in our small cupola, holding the iron in ladles. We never had the bottom of our tuyere more than six inches above the sand bottom to the cupola, and in two cases had nearly a ton of iron in two ladles, and never had any mistake happen.

H. H. LEONARD,
Butler, Ind.

Among the Foundries.

The Highland Foundry Company, at Denver, Colo., are in their new foundry.

The Lebanon Foundry and Machine Works, at Lebanon, Ind., have taken off their first heat.

The Sessions Foundry Company are adding a twenty-five ton electric crane and two hydraulic cranes to their equipment.

The new foundry of the New Departure Bell Company, at Bristol, Conn., is running. It is double the size of the old one.

The Haughton Foundry & Machine Co., of Toledo, Ohio, have made an assignment.

Toussaint Crevier operating a foundry in Montreal has assigned.

The Plymouth Iron Foundry, of Brockton, Mass., has been sold to W. H. Perkins, of Watertown, Mass., who will operate it in the future.

The City Hall Tower in Milwaukee is to have a ten-ton bell. It was successfully cast on the 18th instant at the foundry of Gardiner, Campbell & Sons in that city, at a cost of $4,000.

Brownell, Schmidt & Company have placed in the power house of the Fairmount Transportation Company, of Philadelphia, one of their Improved American Fuel Economizers. They have recently shipped one to South Africa, and have enough work on hand now to keep them running full handed for some time.

Books, Exchanges, Catalogues, Etc.

J. W. Paxson & Company, Philadelphia, are pushing the sale of an "Iron Filler" for filling up holes in castings. It is said to become almost as hard as the metal itself when thoroughly dry.

The Leesburg Foundry & Machine Company, at Pittsburg, Pa., send us a copy of their latest catalogue. It is an unusually handsome production and ought to prove very valuable to anyone interested in machinery for rolling mills and tinplate plants.

Anything in the way of printed matter emanating from the office of F. B. Stevens, of Detroit, is sure to be original and worth studying. The latest is his catalogue, original in design, size, contents and method of illustration. Foundrymen anywhere and everywhere might learn something from it.

New Foundry Enterprises.

Einsweiler Brothers have erected and will conduct a foundry business at East Galena, Ill.

The Rempis & Gallmeyer Company is a new concern at Grand Rapids, Mich. They have been incorporated for $15,000 with $8,100 paid in and will operate both an iron and brass foundry.

The Builders' Iron Foundry at Providence, R. I., are compelled to seek larger and more commodious quarters, as the increase in their business and the nature of their work makes it necessary that they have facilities impossible to obtain in their present location.

The Robinson Foundry and Machine Shop

has been incorporated at Birmingham, Ala., capital, $25,000. J. A. Wiggs is president.

M. R. Wilhite and R. J. Stockman have leased the old Scales foundry at Knoxville, Tenn., and are operating it.

The Houlton Foundry and Machine Company is a new concern at Houlton, Me.

The Hyde Windlass Company, of Bath, Me., is building a foundry.

The Kutztown foundry and machine shop has been incorporated at Kutztown, Pa.

The McColgan Machine Shop, Foundry & Mill Supply Company is the title of a new concern at McComb, Miss.

The Morris Machine Company, at Baldwinsville, N. Y., has built an extensive addition to their foundry.

The Millet Core Oven Company, Brightwood, Mass., send us their latest catalogue. The most effective argument presented, however, in favor of this oven, is the very long list of names of prominent foundrymen in all parts of the country having them in use.

THE FOUNDRY has no idea that the malleable iron business has grown to such proportions as it evidently has, judging from the mammoth catalogue, showing their productions, and just sent to us by the Torrance Iron Company, of Troy, N. Y.

Much of the work made now in grey iron foundries it seems to us, could be made more advantageously in malleable iron were its availability more generally understood.

The Coates Piano Plate Co. has recently been organized in Toronto, Can., with the view to making a specialty of the manufacture of piano plates for the Canadian trade.

The foundry department will be under the management of Mr. Edmund Stanley, who has had a wide experience in some of the best shops of the United States in this line. Under his direction the shop has been fitted out in an up-to-date style and will be ready to take off the first heat about the middle of September.

Mr. Coates has been long known to the piano trade as the best maker of piano strings in the country, so that with the first-class castings which Mr. Stanley's experience guarantees, it is confidently expected the new concern will not only meet with success, but supply a longfelt want in the piano manufacturing industry of Canada.

In Pennsylvania.

S. Morgan Smith, York, Pa., is running full time and all the molders they have room for, and cannot turn out work fast enough. They have large contracts ahead which will keep them busy for some time to come.

Slaymaker, Barry & Co., Lancaster, Pa., manufacturers of locks and hardware sundries, have closed a deal with the Connelsville, Pa., board of trade, and will move their whole plant to Connelsville about October 1, 1896.

Worth Bros. & Co., Coatesville, Pa., have built two steel furnaces and have the same running. This making their own steel ingots from which they roll their plates is a new departure for these people. They also complain of business being dull.

The York Mfg. Co., York, Pa., have closed a contract for about 100 tons machinery castings for a Philadelphia firm. They are putting on more molders. Happy is the man who gets employment in this foundry. A large new shop, electric crane and all new fixtures, but the molder must be a first-class mechanic to get a floor.

The Chalfont Mfg. Co., Lancaster, Pa., manufacturers of hardware specialty, have rebuilt, but have not as yet started their foundry and machine shop at this place. This plant was destroyed by fire early this spring. They are running a small plant at Atglen, Pa., which they find large enough for the present volume of business.

P. M. Sharples, West Chester, Pa., manufacturer of cream separators, is experimenting and has nearly perfected a new cream separator for dairy farm use. The old machine run at a speed of 8,000 per minute. The new separator will run 20,000 per minute. They have had some difficulty to get a bearing that would not melt running at this speed. They expect to have everything perfected by September 1, 1896, at which time they will start up full time, as this machine will revolutionize dairy farming.

The Grey Iron Casting Co., Mt. Joy, Pa., manufacturers of hardware and iron toy specialties, have moved into their new plant and are running full, orders ahead. Their old plant was vacated to allow the Pennsylvania Raidroad Co. to make a short cut

through the town. The price paid by the railroad company was up into the thousands.

The Champion Blower & Forge Co., Lancaster, Pa., have recently moved into their new machine shop, which is one story high, 300 feet long by 60. They have light all around and it makes one of the finest shops in the country. Their old shop was destroyed by fire early this spring. They expect to make some improvements to their foundry shortly, when they will be in a position to turn out double their former capacity.

Marietta Mfg. Co., Marietta, Pa., manufacturers of electric fans, farm machinery and job castings, are running half time at present; expect to start up full shortly.

The Wilson Laundry Machine Co., Columbia, Pa., are manufacturing a complete line of steam laundry machinery, and all supplies pertaining to a complete power laundry. They have recently employed a Philadelphia foundry man to manage their foundry department and are well pleased with the work he has turned out. They are running full time, with orders ahead.

Foundry Mention.

Goff & Welch, iron founders at Milford, Mass., have dissolved, the former retiring.

Kelly's foundry, at Portland, Me., was destroyed by fire July 27.

W. L. Bise is now in charge of the Blacklock Foundry at South Pittsburg, Tenn.

King & Walker's foundry, at Madison, Wis., was destroyed by fire July 11. Loss $2,000.

Dobbie & Stuart's foundry, at Niagara Falls, was totally destroyed by fire August 3. Insurance $30,000.

The Kelly Foundry & Machine Co., of Goshen, Ind., have suffered from an $8,000 fire.

The Sycamore Foundry & Machine Co., at Sycamore, Ill., operate three foundries, and are making some large additions to one known as the Marsh Binder Foundry.

The foundry of the elevator works of Otis Bros. & Co., on Atherton street, Yonkers, N. Y., was burned on August 1. The loss was about $20,000.

It is said that the New York & Cleveland Gas Coal Co. will erect a foundry and machine shop at Turtle Creek, Pa.

At Massillon, O., C. O. Olsen's foundry and machine shop burned June 14. The fire is thought to be incendiary. The loss is put at $15,000; insurance $10,000.

The Springfield (Mass.) Republican of recent date gives a view, accompanied with a descriptive article, of the new works of the Bausch & Harris Tool Company being erected at that place.

The Morris Machine Works, of Baldwinsville, N. Y., have increased their capacity by building an extensive addition to their foundry. They are crowded with orders for pumps and engines.

The W. H. Wood Foundry Co.'s plant, at West Troy, N. Y., was destroyed by fire June 5. The loss is at least $18,000, and insurance $11,000. All the concern's valuable patterns were burned, as well as a number owned by outside parties.

Miller, Wagoner & Bently, of Columbus, O., have been made agents in the Pittsburg district for Tuscarawas, the well-known foundry iron from Dover furnace, Canal Dover, O., are also exclusive agents for Rockwood, Tennessee, iron and Princess, Virginia, foundry iron, and for Bloom and Madison Hanging Rock charcoal iron and Jackson County silvery iron.

A gas exposition is the latest, and it is intended to make it a brilliant affair. It will be held in Madison Square Garden, New York, and will last for two weeks, beginning January 25th, 1897. All those interested in any way in the manufacture of gas or gas appliances will find much of value to them at this display.

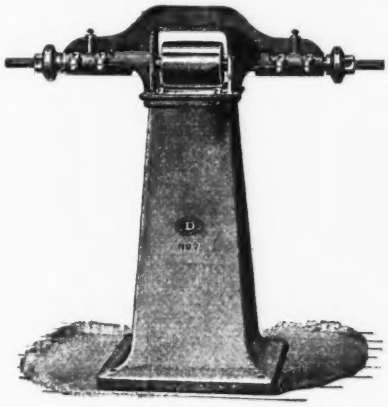
The United States Radiator Works at West Newton, Mass., have started up.

The Warren Foundry and Machine Company at Providence, R. I., is making all the bronze and some of the iron castings for a torpedo boat being built at Bristol, Conn.

The Davis Coal and Coke Company, of Piedmont, W. Va., are sending a neat circular to the foundry trade concerning their foundry coke in particular and coke in general.

A New Polishing Lathe.

We present herewith a cut of a new polishing lathe recently put on the market. It is designed to carry either solid leather wheels, wood wheels covered with leather, or buff wheels. As will be seen from the cut the lathe has a heavy, substantial head, with extra long bearings and an overhanging arm, which gives great strength and stiffness. The boxes are protected from the entrance of emery and other dust. The column is hollow and of sufficient size to permit the machine to be belted from a countershaft running below the floor. The head is mounted on a short column for bench use if desired, but



the cut shows the machine as a floor lathe. The boxes are babbitted with the best metal. The spindle may be provided with either a single, tight and loose or a cone pulley. The machine is designed to meet the requirements of manufacturers who desire a first-class lathe but do not feel like purchasing one of the higher priced machines made by the same company. The spindle is 48" long, 1¾" diameter in the boxes, and 1¼" between flanges. The entire weight as shown is about 400 pounds. The machine is made by the Diamond Machine Co., of Providence, R. I., who manufacture a large line of grinding and polishing machinery.

Mr. E. N. Dies has taken charge of the Broadhead Foundry and Machine Shops at Broadhead, Wis.

Must say THE FOUNDRY fills the bill.

T. R. LOGAN,
Brantford, Ont.

Foundry Record Sheets.

In our last issue we printed an inquiry from one of our readers who desired to see some of the tables or forms in use among foundrymen for keeping a record of foundry work.

We have received a few replies to this request, which we give as follows:

Newburgh, N. Y.

From Wm. D. Foster we have received tables 1, 2 and 3, which are intended for the following purposes: No. 1 is the daily record of the work done by each molder, showing number of hours worked and weight of perfect and imperfect castings. This page can be used as well to show the time of helpers, coremakers, chippers, etc.

Table No. 2 is a cupola record, showing the material used in iron foundry daily. (Columns 1, 2, 3 and 4 are intended for brands and quantity of pig iron melted, and should be written in.)

Table No. 3 shows the quantity and quality of the material used in a brass foundry.

From Fay & Scott, Dexter, Maine, we have received Nos. 4 and 5.

Table No. 4 shows slip that is printed and given to melter. He is supposed to fill in the date and kinds and quantity of iron used in each charge, amount of fuel, etc. From him it goes to the clearing room, where the blank spaces intended for "Good Castings," "Poor Castings," "Sprues," etc., are returned, filled out, and from there it goes to the office, where the total amount of iron melted, proportion of iron to fuel, etc., are figured. From these slips then the net results are entered in a book with pages ruled as per table No. 5, thus giving a complete record from day to day, showing the results of our foundry work all in convenient form for purposes of comparison.

Another friend sends us tables Nos. 6 and 7, which we give in detail, as they are self-explanatory. In this slip they have printed in the names of the different branches of pig iron used.

J. F. Mills, Jr., Port Chester, N. Y., sends us diagram No. 8, which it will be noticed has several features very similar to others, while original in other respects.

A "Subscriber" sends us form No. 9, which it will be observed is somewhat simpler than others and does not give the various brands of iron used for the various heats.

TABLE I.

FOUNDRY RECORD,.....189....

ORDER No.	PIECES.	NAME OF EMPLOYEE.	PERFECT CASTINGS.	IMPERFECT CASTINGS.	HOURS.

TABLE II.

DATE.	No. 1	No. 2	No. 3	No. 4	Mch. Scrap.	Stove Plate.	Total Melt.	Time to Melt.	Proportion of Fuel to Iron.	Foundry Scrap.	REMARKS.

TABLE III.

DATE.	Scrap Brass.	Scrap Copper.	Pig Copper.	Phosphor Tin.	Block Tin.	Spelter.	Lead.	Antimony.	Castings.	Sprues.	Scrap.	Coal or Coke.	REMARKS.

TABLE IV.

FAY & SCOTT, FOUNDRY RECORD, ... 189

CHARGE NO.	SCRAP.	SPRUES.					COKE.
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
TOTAL							

GOOD CASTINGS,	LBS.	TOTAL LBS. IRON MELTED.	
POOR CASTINGS,	LBS.	PROPORTION OF COKE TO IRON.	1 to
SPRUES, ETC.,	LBS.	SHRINKAGE PER CENT.	

TABLE V.

DATE OF MELT.	Total Lbs. of Iron Melted.	Lbs. Iron to 1 of Coke.	Per Cent. of Good Castings.	Total Lbs. Good Castings.	Total Hours Labor.	Total Cost of Labor.	Total Cost of Coke.	Total Cost of Iron.	Lbs. Castings per 1 Hour Labor.	Labor Cost for 100 Lbs. Castings.	Labor, Iron and Coke Cost of 100 Lbs. Castings.	Expense Cost for 100 Lbs. Castings.	Total Cost for 100 Lbs. Castings.	REMARKS.

TABLE VI.

STATISTICS OF MELTS FOR.....

Brand of Iron Used.	Quantity Melted.	Price per Ton.	Coal Used LBS.	Coke Used LBS.	Wood Used	Cupola Men's Time.			Weight of Defective Castings Gates, etc., after cast.	Total Weight of Good Castings Produced.	Amount Melted in Cupola.	Time to Melt.
						Hours.	Rate.	Amount.				

Compressed Air and Its Economies in the Foundries.*

BY CURTIS W. SHIELDS.

Perhaps in no other operation in the foundry is air used to such good advantage as in hoists and cranes. By using direct acting hoists suspended from trolley tracks and using detachable air hose couplings, a casting or other weight can be readily conveyed to any part of the foundry or carried outside the foundry building to the machine or pattern shop, or in fact to any point around the establishment that may be desired, thus covering a field vastly wider than is possible with a traveler alone.

The great economy of an air hoist is well illustrated in the following record of actual work performed in the foundry of Messrs. Russell & Co., of Massillon, O. In making wheels for their traction engines, a molder and helper formerly made one mold per day of a wheel 16 inches face by 66 inches diameter. During the entire operation of molding and pouring, 104 hoists and lowers were necessary. With the old crane, it took these two men from five to six minutes to turn a flask, when assisted by a laborer on the windlass. Now, with the air hoist, the laborer is done away with, and they turn a flask in two minutes. This saves in time alone 52 times 3½ minutes, or three hours per day, and the molder and helper make in the time saved by the air hoist two 58x12-inch wheels in addition to the large wheel, which formerly constituted a day's work.

In this same foundry a test of one of their jib cranes gave the following:

Area of piston, 452.39 square inches (24 inches diameter).

Height of lift, six feet.

Hoist, two feet to one foot of piston travel.

Weights lifted, 2,000, 4,000 and 5,000 pounds.

Main air receiver gauge, 100 feet from crane, registered 63 pound pressure.

Gauge on hoisting cylinder, 30, 40 and 45 pounds for the respective hoists.

It was found that it took 10 pounds pressure on hoisting cylinder gauge to overcome the friction of the chains wrapping around the sheaves, as well as of the packing in the

*Paper read before the September meeting of the Western Foundrymen's Association.

TABLE VII.

SUMMARY OF MELT FOR .....

	Weight.	Rate.	Amount.		Percentage.	Rate.	Amount.		Test of Strength.	Remarks.
Brand of Iron Used.					%				Bar 12x1 in. Square.	
					%				1st Lbs.	
					%				2nd Lbs.	
Scrap					%				3rd Lbs.	
Coal.....					Cost per	Ton.			4th Lbs.	
Coke										
Wood					Proportion of					
Time.....					Fuel	to	Iron.			
Proportion of General Expenses					lb.			lb.		
	Total Cost									
Cost of Iron per Lb. Melted										

DATE. ..... No. ..... CUPOLA.	Lbs. Limestone.	Lbs. Coal.	Lbs. Coke.	Name of Iron.				Sprues and Scrap.	Lbs. at each Charge and Total.
CHARGE.									
Added	.....	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lbs. of Each.	.....	.....	.....	.....	.....	.....	.....	.....	.....

Recorded by .....

REMARKS.

Time of Melting....Hrs....Min.
Lbs. of Iron over.....
Lbs. of Fuel over.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

Fire Lighted.....	.....
Blast Put on.....	.....
Iron Flowed.....	.....
Blast to Iron.....	M .....
Dropped Bottom	.....
Blast to Drop of Bottom.	H M .....

1 Lb. Coke Melted ..... Lbs. Iron.

Pressure of Blast in Ounces.

Time.	Time.	Time.	Time.	Time.	Time.	Time.	Time.	Time.	Time.
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Good Castings.....	.....
Loss in Scratch Shop	.....
Loss in Gangway.....	.....
Weight Sprues.....	.....
Weight Gangway Scrap....	.....
Weight Pig Beds..	... .
Weight Shot Iron.....	.....

Condition of Metal. Poor. Med. Sharp. V. Sharp.

TABLE IX.

CUPOLA NO. ..... DATE .....

CHARGE.	IRON.	COAL.	COKE.	LIME.	
1					Blast On
2					1st Iron
3					Bottom Down
4					Blast ozs.
5					Cyl. Mixture
6					Mch. Mixture
7					Com. Mixture
8					Total Heat
9					Sprew
10					Good Castings
11					Bad Castings
12					Return Iron
13					Return Coke

stuffing box of the piston rod and the frictional resistance of the piston against the cylinder walls.

Weight lifted 6 ft.	Pressure on Piston.	Deducting 4523.9 lbs. as being amount required to overcome all resistance except load we get.
2,000 lbs.	6785.85 lbs.	2261.55 lbs.
4,000 lbs.	9047.80 lbs.	4523.9 lbs.
5,000 lbs.	10178.77 lbs.	5654.87 lbs.

The excess of 261.55, 523.9 and 654.87 pounds in the respective cases is, no doubt, due to the fact that the chains are hugging the sheaves tighter under the loads than when empty, and this increased friction must be overcome at the expense of pressure. The ten pounds required to overcome the load and frictional resistance of the chain, chain block, etc., in the crane itself is not altogether wasted for the space in the cylinder between the piston and the head on the lifting side being once supplied with this amount is then ready to do useful work. A 24-inch cylinder with piston moved three feet would contain 28.275 cubic feet of free air if the gauge on the cylinder showed 30 pounds, or two atmospheres pressure, and 10 such hoists would use 282¾ cubic feet of free air. This amount of air would not cost over one and one-half cents. With compressed air at five cents or less per 1,000 cubic feet of free air delivered at 100 pounds pressure, this is vastly cheaper than a gang of men on a windlass with the molders standing idle an indefinite time. The frictional loss in direct air hoists has been shown by tests made by the Whiting Foundry Equipment Co. not to exceed 15 per cent. A lot of 12 hoists taken at random showed a

varying loss of from 9.2 to 23 per cent, average 12.9 per cent loss. Another lot of 10 averaged 14.65 per cent loss. Mr. Chas. O. Heggem, the well-known compressed air expert of the above company, uses compressed air for breaking test bars, and at the same time automatically recording the shrinkage and deflection. The pattern for the test bars is 24⅛ inches long, and in the case of a bar tested the register showed a shrinkage of 9-64 inches to the foot; deflection, ½ inch in 24 inches, and the bar, which was one inch square, broke under a pressure of 1,375 pounds.

In view of the great variety of ways (more or less unsatisfactory) of testing the qualities of iron as expressed last May at the meeting of the foundrymen in Philadelphia, Pa., it would appear that the majority of founders using air could adopt Mr. Heggem's idea with advantage.

Large compressed air traveling cranes are coming into use in foundries, and a short description of one at the works of the Ingersoll-Sergeant Drill Co., at Easton, Pa., which has a novel single eccentric reversing gear, may not be uninteresting.

This is a 20-ton traveling crane with a 40-foot span. It has three duplex air engines, one for each motion of the crane. The engines are reversible and very simple in construction, each cylinder having a valve which has both a rocking and a shifting motion, the cylinders having two sets of ports, one set direct and the other crossed or leading to the opposite ends of the cylinder. With this arrangement, only one eccentric is required for a cylinder, and the engine is reversed by shifting the valve by air. There are two air pipes leading to the valve chest of each engine, the other end of pipes leading to a valve box on the cage of the crane. In this valve box are three slide valves operated by levers which control the speed and direction of the three movements of the crane. When the levers of the valve box are in a central position, the ports in valve box are covered and the crane is stationary; but when moved in either direction, air is passed through one of the two pipes leading to an engine, which shifts the valve and brings one set of ports into play, making the engine run one way. When shifting the lever in the opposite direction, air is passed through the other pipe leading to engine, the valve is shifted in the opposite direction and the engine is reversed in its movement.

The travel of the crane is 460 feet, and air is supplied to same through a continuous hose of about 480 feet in length, fastened to building at one end and to the crane at the other, and is held up at intervals of 25 feet with cast iron swivel sliders which move on channel beams bolted to the roof of building. On the forward movement of crane, the hose is drawn out very nearly straight, and on the return movement, it fills in loops, the hose turning on the swivel joint as the two slides come together, making it set at right angles to the slides. In this position, the hose occupies very little room, the 480 feet, when looped up, using only about 10 feet of track.

Compressed air cranes have many advantages over those electrically driven for foundry work, as the dust and heat which materially affect the efficiency of electric motors have no appreciable effect on the air meters.

Few if any of the compressed air driven machines that have been introduced for foundry work serve a better end than the sand blast. By its aid castings that were hitherto cleaned with the greatest difficulty can now be cleaned in a remarkably short time and with a tithe of the exertion formerly necessary. For instance, a casting which was made with a core that was almost impossible to get out satisfactorily, and which took 45 minutes to clean by hand, was cleaned by the sand blast in 16 minutes. Six and one-half minutes of this time was occupied by chipping out a fin to allow the blast to reach the core. The waste sand from a sand blast can be used to advantage in making cores when mixed with the core sand in proportion of about one to four.

Another important use of compressed air is in connection with the molding machine. By its use the expense of stripping plates is entirely done away with, and by using an air jet to blow sand from the pattern instead of using a bellows and brush much time is saved. The use of air permits the molding machine to be moved to any part of the foundry, and it is decidedly cheaper to bring the molding machine to the sand pile than wheel the tons of sand to the machine.

A deeper draft is possible using air than can be obtained with a steam actuated machine. In general, a molding machine operated by compressed air is portable, indepen-

dent of any foundation, and can be connected to the air main by a hose and used in any part of the foundry, which is not possible when using steam. It makes molds without the use of stripping plates, in fact uses ordinary split-wood or metal patterns fastened by wood screws to the pattern plate. This is accomplished by the use of an automatic rapping attachment which frees the pattern from the sand, without any amplitude of motion in the pattern while it is being drawn. This compressed air molding machine weighs and costs but little more than a hand machine and has all the advantages in point of output and size of flasks of power machines. Observation of an air actuated molding machine operated by two helpers at $1.50 per day each showed that on certain work containing 12 small cores per mold they put up 50 molds per day. Formerly it took four helpers at the same wages to make 50 molds by hand per day, thus saving in wages 50 per cent.

In another case, on new work, the first day two helpers at $1.50 each per day turned out 35 molds. The best record on this work for a molder working by the piece was seven molds per day.

The product of a molding machine can be greatly increased if the handling of the sand in shovels is done away with. This is accomplished by an air jet which, at 60 pounds pressure, will lift 100 pounds of sand per minute 20 feet high. A quarter-inch nozzle will use 90 cubic feet of free air per minute doing this duty. By elevating the sand to a bin overhead and then conveying it in a chute or pipe directly over the molding machine much time and labor can be saved. A simple slide in the pipe forms a ready means of regulating the amount of sand served to the machine for each mold.

After deciding to adopt compressed air as a labor saving aid in the foundry, the most important points for consideration are the type or style of compressor to install, and its size or capacity. Only too frequently confined space, together with a disinclination to expend more than will barely suffice for present needs, act as a handicap and incline the founder to decide upon a plant that "will do somehow," rather than one that his cold, unbiased judgment would dictate as being best suited to his needs. It is the exception to find a plant too large even for present needs, for while starting out with the best intentions to allow for a reserve, the ingenious foundrymen originate so many little labor saving shop kinks that before long there is a demand for more air, and the engineer is told to "speed her up a few turns."

When it is decided to use air hoists, cranes, molding machines and other air actuated machinery, it is imperative to bear in mind that if the air supply stops through break-down or insufficient capacity, the whole foundry is practically at a standstill. If there is no air to operate the hoists the men cannot handle their work, and great loss ensues.

It is clearly of the utmost importance that the source of air supply must be adequate to all reasonable demands and must be of such staunch and durable design and construction as will insure its ability to easily meet the increased duty when called upon to "speed up a few turns." These "few turns" usually mean about 20 per cent increase, and it is only the very best high duty compressors that will survive such a test.

It is an open question which must be largely decided by the individual conditions in each foundry, whether a steam driven or belt compressor is most desirable. Where there is shafting already in the foundry and a good dust-tight room can be provided, it is perhaps cheaper to put in the belt driven type. The steam compressor has its advantages, however, as it can be located in the engine room under the supervision of the engineer, and the necessity for shafting and belting is obviated. As the best steam actuated compressors now use steam very nearly if not quite as economically as the majority of shop engines, low efficiency cannot be urged against their use with the same force as formerly.

The steam machine can be run at a speed to suit the requirements of the foundry by regulating the throttle. On the belt driven compressor a change of revolutions means a change of belts and pulleys. In both cases, a regulating or unloading device is desirable and economical, and regulates the compressor so that a constant pressure is kept in the receiver or reservoir. Compressors are now made in a variety of types to meet all the conditions and requirements of the various trades. Just as compound engines took the

place of the single cylinder engine, so now air compressors compress air in two or more stages while being driven by compound engines. This feature, combined with the well-known piston air inlet device, has resulted in the production of the "Triplex" compressor.

This is essentially a duplex steam machine with tandem two stage air cylinders, and was designed to fill the long-felt want of a compact, economical, high duty compressor. The advantages of this machine may be summarized as follows:

1. Self-contained and compact, using little or no foundation.

2. Duplex Steam cylinders, with steam cranks at 90 degrees and air crank at 135 degrees from each steam crank.

3. Tandem compound air cylinders with perfect inter-cooler.

4. Fly wheels in direct line with air cylinders where work is expended.

5. All parts easily accessible.

6. Can be arranged with air cylinders for any pressure.

7. Steam cylinders cross compound.

8. Piston inlet air valve on low pressure air cylinder and all other inlet and discharge valves having vertical lift.

In all air compressors the hard work is done by the fly wheel. In a regular duplex machine the steam is cut off and the fly wheel is forcing the air piston against the maximum resistance doing this work around the angle of the pillow block, thus:

With the "triplex" this work is done by two fly wheels, both acting in a direct line with the load, thus:

The piston inlet and vertical lift poppet valves are preferable to the old style horizontal poppet valve for many reasons. These horizontal valves are very apt to occasion endless trouble, particularly when located in the cylinder heads, as a broken stem or a loose nut permits the valve, or part of it, to drop into the cylinder.

It is not practicable to make poppet valves of any great diameter, hence in a large compressor it is necessary to use a number of these valves. This divides the air entering the cylinder into several small streams, which, passing over the surrounding heated surfaces, greatly increases the friction of the air entering the cylinder and decreases the capacity of the compressor.

By removing these inlet valves from the cylinder head, a large cooling surface equal to about three-quarters of its area is obtained. This is more valuable for cooling than the cylinder jacket alone, because the air is hottest after the piston passes the center of the cylinder.

Most of the difficulties and disadvantages of the poppet inlet valves have been successfully overcome by the piston inlet valve. This device comprises a hollow tail rod passing through a stuffing box in the back cylinder head; a hollow piston into which the air is admitted through the tail rod, and a ring valve of T section on each side of the hollow air piston head.

These ring valves allow the air to pass alternately into each end of the cylinder, and are actuated by means of their own inertia, opening or closing at the moment compression ceases or begins. These piston valves are exceedingly durable, as they are forged from a solid billet of dead soft open-hearth steel, are made without a weld. Severe tests of long duration have proved them to be practically indestructible, five years of constant duty night and day scarcely sufficing to show any appreciable wear on them. By means of the piston inlet a concentrated inlet current is secured.

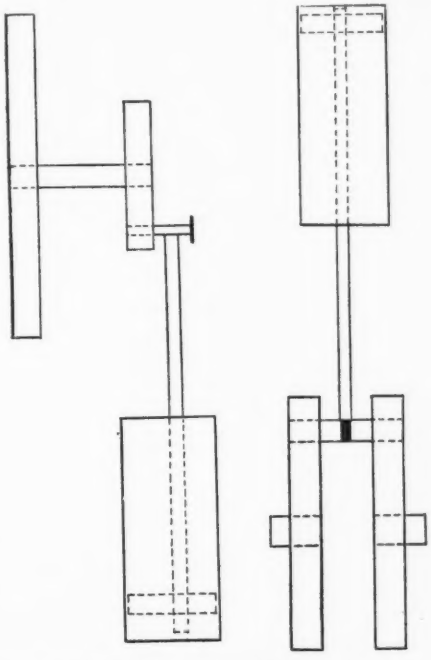
A suitable sleeve or conduit pipe should be made to conduct to the tail rod inlet air drawn from a source outside of the engine room, most favorable to coolness, dryness and freedom from dust or other foreign matter. Air when admitted cold to the cylinder results in a larger volume of compressed air for a given diameter and stroke of cylinder. It is plain, therefore, that too much stress cannot be laid on the importance of a cold dry inlet, and an efficient method of water jacketing, particularly in the cylinder heads.

Transmission of power by compressed air has the advantages of certainty and regularity in action, simplicity in machinery, freedom from the possibility of fatal accidents, and the assistance given to ventilation and cooling the shop. These last are considerations of much importance in many cases. Works employing this method do not require the supervision of a specially qualified expert, and the chances of interruption by accident through negligence are certainly less than in any other form of power transmission.

When we come to the question of laying out the piping for a foundry, it is well to remember that the head necessary to drive the air through the pipe is as the square of the velocity, and to obtain the best results the flow of air through the pipe should not exceed 20 feet per second. If this is borne in mind, air can be conveyed almost any distance with little or no loss.

The receiver should be placed in any convenient place and should be of a capacity not less than the rating of the compressor in cubic feet of free air per minute.

It is preferable to have the inlet pipe from the compressor enter the receiver near the top and the outlet near the bottom and at right angles to the inlet. A drain cock at the lowest point should be provided and a



pressure gauge and safety valve on the top.

Leaks in air pipes are fortunately easy to find because of the hissing noise caused by the escaping air. This is an important point in comparing pneumatic with electric power transmission. Leaks in electric wires are hard to discover and are usually found after some damage has been done.

A little thought and attention given to the elimination of turns and angles in the pipe mains will amply repay for the trouble. It is economical to lead the air mains centrally and then run smaller connections to points adjacent and convenient to the places where air is to be used.

If this is done, short lengths of hose pipe can be attached wherever most convenient for connection to hoists, molding machine, sand sifter or other apparatus, or the air can be used for the same purposes for which the bellows and brush are employed.

Making Clean Castings.

By PRACTICAL MOLDER.

To make castings clear of all dirt so that when finished they will be perfectly clean is an undertaking that should be more universally successful than it is. The reason why there are so many failures can generally be traced to the molder's ignorance of the proper safeguards necessary. But few of those who spend their lives in the foundry take the trouble to go into a machine shop and look at their castings after they have been finished off, or while they are undergoing that operation.

The foreman of the foundry goes to the molder and tells him that the cylinder he cast a day or so ago is full of dirt, and will have to go to the scrap heap. The molder replies that the iron is dirty, makes a second one the same as before with the same result, and gives the same excuse. Now he has never studied the subject of cleaning castings as thoroughly as he should have done, and many of our so-called good foremen are unable to help him out of his difficulty.

The most prolific cause for trouble of this kind is owing to the too frequent use of dirty iron. The molder goes to the cupola and gets a ladle of hot metal, carries it or has it swung to his floor by the aid of a crane, looks at it, and says "this is too hot;" hunts around and finds some warm gates or scrap, puts them in his ladle, stirs it up for some time until it is a good red color, and then, with the remark, "I guess it will do now," pours it. The next morning he removes the casting, and as he observes the dull blue skin to which the sand has not adhered very closely, he thinks to himself that it is a very nice casting, but when the lathe or planer begins to work on it he finds it full of dirt, and it has to be thrown out or plugged up, and is not, therefore, a first-class job.

Dull iron will never make clean castings. The molder may put all the cleaner or whirl gates that have ever been invented in a mold, and if poured with dull iron it will be dirty, nine times out of ten. With my experience, the hotter the iron the cleaner the casting. Perhaps next to the foregoing the most frequent reason for poor castings from that defect is owing to improper gating, but few molders pay proper attention to this, or take the necessary precaution to insure the best results.

A foreman gives a molder a job; he looks it over, measures it, goes through the yard, finds a flask for it, brings it in, rams up or beds in his pattern without stopping to think about gating or pouring until he puts on the cope; then he finds the flask is too small to permit of its being gated where it should be, and he finds that perhaps he has to pour it on the top, possibly near the center. After hunting around and securing a couple of gate pins (perhaps both of them too large), he rams up his cope, finishes it, puts a basin to his gates and when he comes to pour it, finds that his gates let the iron in to the mold too fast, and he can't keep his basin full, and dirt and all goes into the mold; while if the proper judgment had been used and appropriate gate pins secured, both could have been kept full and the casting would have been good if poured with hot iron, notwithstanding size of the cope.

In making the cylinders for paper-mill machinery, which run sometimes from 24 to 96 inches in diameter and from 48 to 98 inches long, and which are not very thick, a molder has a chance to test his ability in this direction, as he must have the casting clean from dirt and blow holes, as an imperfection of the smallest kind may cause them to be thrown out. In my experience the best results have always been secured by pouring them direct from the top end or edge as they are cast always on end. Small round gate pins about half an inch in diameter could be placed eight inches apart or less, and when the molds are closed the runner box should be placed on top with a large basin that will connect them all. If this method is followed and the mold is in good shape and the hottest of iron used, a good casting can be secured every time if the basin is kept full.

I have poured one that was 48 inches in diameter and 60 inches long in 11 seconds. The iron dropped down from the top of the mold to the bottom, over six or eight inches all around, keeping it alive and hot, carries all the dirt the mold makes or is in the iron up to the four-inch head on top. A good foundry manager knows that the loss from castings that are dirty is not only a loss of castings, but also a great amount of labor in the machine shop, as the dirt cannot always be seen until the planer or lathe have been at work some time.

Mending Broken Castings.

JAS. McCASH.

In 1850 when I went to learn the foundry business at the Phoenix foundry in Glasgow, the practise of "burning" or "welding" cast-iron was really more common and more generally understood by the rank and file of those working at the business than it is now.

The kind of work done was nearly all light and as is the practise to-day the men worked by the piece. It very often happened that an ingeniously managed job of "burning" would save a valuable casting and each man had to do his own work in that line.

In those days to burn the spout on a teakettle was considered quite a trick. They were all cast-iron and made with what was known as a goose-neck spout. When one of these fell or received a knock the spout would invariably burn off close to the body and to burn this on so that it would not be conspicuous and be perfectly water tight was where the fine work came in. The body was filled with fine heap sand and the spout was the same. The body of the kettle was bedded in a drag on the floor with the broken point uppermost so that when the spout was fitted to the broken place it would be as nearly as possible in a perpendicular position, or better still, to have the crack as nearly as possible level to ensure an equal flow of iron all around it.

A parting was then made, the spout fitted on cope and rammed up, care being taken to hold the spout so as to prevent its being tipped over, and two gate pins set in, one on each side of the spout and slanting from it. After the cope is taken off, cut a small fillet around the neck in the cope, having the

most of it on the inside of the spout, and make a couple of small clean gates from gate pins to the casting, one to pour through and one to flow off the iron, close on the cope, be sure to have flow-off considerably lower than the one from which the iron is poured, get a small ladle full of hot iron and flow it well through which will weld the spout on to the body, and if the job is done neatly it will be almost impossible to detect it.

In burning the journal on a roll we generally molded the journal in dry sand and laid in place. The flow-off is taken from near the parts to be welded in order that cold iron will flow away readily.

The hot iron should fall directly from above the broken casting and when you can feel with a rod that the metal has cut into the casting sufficient to ensure a good job, stop up the run off with a piece of clay or otherwise, but there are other castings that are sometimes necessary to warm with a coal fire, such as a pan or kettle in the form of hollowware or arranged in the form of a pipe or cylinder. This heating is to prevent cracking, caused by the too sudden expansion or by the irregular contraction while cooling, therefore the best judgment is necessary at such times.

With the majority of burns, however, very little treatment is required. In the majority of cases one part of the casting can be bedded in the floor and the piece that has to be burned in neatly welded to it, and then with the usual gate pins and place to blow off in it is not a difficult matter to make a very excellent job.

A very common practise is to cover over a burn with some kind of facing. This has a good effect, if properly done. When pure ground charcoal as a facing was used in the molds it was freely spread over the burned place and thus was caused a sort of annealing process, this rendering the burned place easily chipped.

In all cases great care should be taken to see that the broken spots are free from rust. The leading points to be observed are, clean surface, hot soft metal, good arrangement for pouring and neat molding.

August Ziemer & Company's new foundry at Kewanee, Wis., has started up. Mr. Ziemer is a practical molder and thoroughly understands the business.

JAMES CHALMERS.

The History of a Tramp Molder.

W. EDWARD.

CHAPTER XXVIII.

When we arrived in Detroit we were both hungry and tired out from our long ride, and, as it was late in the afternoon, we decided to rest up that evening and make the round of the shops the next day. After a hearty dinner we wandered around to see the sights of the city and finally wound up at the river, where we took a boat for Belle Isle, the island park of Detroit, and one of the most beautiful spots imaginable. Detroit is really a beautiful city, and one in which the workingman may enjoy more of the comforts of life with less expense than any other city in the United States. I was charmed with the place and would have taken any kind of a job, even in the "Michigan," to spend a month or two in the city.

The next morning we took in the shops, and the first place we headed for was the Riverside Iron Works, having noticed the sign when we were going up to Belle Isle on the boat the night before. There was no watchman to stop us and we walked through to the foundry, which is built on the river bank and where boats may unload or load right from the foundry door. This shop makes marine work almost exclusively, and the molding of a propeller wheel was something which neither "Bill" nor I had ever seen, so we were both interested spectators of the operation of sweeping up a big propeller blade, when the foreman, commonly known as "Young Jack" Smith, to distinguish him from his father, "Old Jack," who was foreman of the Dry Dock Engine Works only two blocks away, came up to give some orders about the job. I had asked one of the men near the door to point out the foreman, and he told me to look for a man with only one eye and who talked Scotch, so I recognized him at once by this description. At the first opportunity I walked over to him and asked him if there was any show for a job, using the broadest Scotch that I could command in the hope of influencing him in my favor by the hint that I was a countryman of his, but the scheme didn't work, as he shook his head and said he had all the men he could find work for at that time.

Most foremen have very little to say to strange molders, but "Young Jack" was very talkative and appeared to be in very good humor with himself and everybody else. Finding that we were strangers to marine work, he showed us some of their heaviest and most complicated castings, most of which were made in dry sand or loam, even taking us out into the yard to show us the various styles and sizes of propeller wheels and their rigging for making them. We swapped experiences and told stories for an hour, and finally left the shop with a very favorable impression of the foreman, but without what we had come for—a job. All the time we were talking Smith had a chunk of clay in his hand, from which he would break small pieces and roll them into a ball the size of a marble; then when he had reached the climax of a story, or in appreciation of one told by "Bill" or I, with a snap of his thumb he would shoot it at some mark with unerring accuracy which must have come from long practice. Sometimes the mark would be a molder or a helper who was standing doing nothing, but he hit his mark every time, and I thought he did this as a reminder that the boss had his eye on them.

Walking up the street a couple of blocks we came to the Dry Dock shop, where "Old Jack" Smith had charge. This, like the Riverside, was also a marine shop, where they made a specialty of heavy marine engines, having turned out some of the largest engines ever put on the lakes. I spoke to a molder near the door, who informed me that "Old Jack" was out somewhere, but if we were looking for work it would hardly pay going on and they were not hiring any new men. When I asked him if he knew of a shop where we might strike a job he mentioned the Michigan car shop and directed us how to get there. I learned afterward that "Old Jack" was surrounded by a gang of "pets" who were jealous of strange molders and always steered them away from the shop, working in some of their friends when any changes were made, which was not often.

Had we been better posted on the location of the shops we would have taken in the Russell shop next, it also being on the river bank and not far from the Dry Dock, but not knowing this we took a horse car for the "Michigan," which is away in the southern part of the city, and after a long ride we reached there about 11 o'clock.

The foundry of the Michigan Car Works is a rambling structure, or rather a series of shed structures, and the molding floors cover an area of an acre at least. While there were some few machinery molders at work in this shop, the bulk of the so-called molders were Slavs and Pollacks who had been broken in to make a certain piece of car work from a match-board pattern, and the amount of work they turned out in a day was simply enormous. A molder and a helper put up fifty oil boxes or forty draw-bars for a day's work, and some of these floors required from one and a half to two tons of iron to pour them off. The metal was brought to the floors on buggy ladles which run on small tracks laid in the gangways. For this work the molder (?) received $1.50 a day and the helper $1.10, and as the blast went on as early as 10 o'clock in the morning, and from sixty to seventy tons of iron were taken out of one big cupola, it was necessary for some of these Pollacks to start to work at 4 o'clock in the morning in order to be ready for the iron.

In the center of the shop, surrounded on all sides by the car work floors, were the machinery floors, and the machinery molders were compelled to work in the midst of the dust and the heat from the pouring and shaking out which was going on all around them. Being in the center of the shop, and lighted only by the skylights in the roof, the machinery floors were very dark and the men all worked by torchlight. Shafting for various kinds of machinery ran through the shop in every direction, and the noise of this, together with the racket kept up by hundreds of Pollacks shouting, swearing and hammering on match-boards with wooden malls, made the place a regular bedlam. How any molder who could better himself would consent to work in a place like this passes my comprehension; yet there were a few good molders who worked there from choice and seemed to like it, but the most of those who worked in the "Michigan" had worked nowhere else and couldn't hold a job in any regular machinery shop.

Just as "Bill" and I arrived at the gates we met a man who appeared to be on the

same errand as ourselves, so I hailed him and asked him if he had ever worked there, and what kind of a shop it was. He replied that he had worked there several different times and it was a regular "slaughter house," but a good place to make a "stake" if a man was broke, as molders were always in demand. He told us his name was Jerry Driscoll and offered to pilot us through the foundry if we wanted to go in and strike the "gaffer," so under Jerry's guidance we ventured into the shop. It still wanted an hour or more of noon, and yet on every side men were pouring off and shaking out whole acres of work, while others were pounding sand for dear life. A man passed us with a club in his hand yelling and swearing at a couple of Pollacks who had struck a snag with a buggy ladle and spilled a lot of iron in the gangway. Jerry informed us that this was the foreman and he carried the club to prod the Pollacks up and help carry out the orders of "Jim" Foley, the superintendent. The foreman's name was Moore, and he knew nothing about the foundry at all, but having successfully handled a gang of laborers in the scrap yard he had been appointed to the foremanship of the foundry when "Windy Bill" Nickleson left about a year before. Foley was the "main guy," though. He gave out the work every morning and looked after the machinery floors. Moore was only employed to walk up and down the gangway with the club in his hand to scare the Pollacks into putting up a "fair day's work."

Jerry led us over to the machinery floors and then asked us what we thought of it. Both "Bill" and I were so bewildered with the noise and could see so little for the dust that neither of us ventured on expressing our thoughts, but just the same we did a powerful lot of thinking, and our thoughts were not at all complimentary to the shop or its management.

We stood and looked around the shop for a few minutes and "Bill," noticing a couple of empty floors, proposed that we strike the "boss" for a job and work a few days for a "stake." "Not on your life," said I. "I'd rather work in the ditch for a dollar a day than in a sweat-box like this for double the wages they're paying." "Bill" was broke, however, while I had a few rocks in my pocket and was more independent than he for this reason, so he concluded to go it alone and went off to tackle Foley for a job. He came back in a few minutes, saying he had hit Foley for a job for both of us, in hopes that I would change my mind, and I could go to work in the morning if I wanted to. I only laughed at him, and when we got out of the shop we separated, "Bill" to hunt up a boarding house, and I, still under the guidance of Jerry Driscoll, to hunt a job in a better shop than the "Michigan."

Jerry steered me up to the Hydrant works first, but as he had quit there the day before, and was not in very good odor, he stayed on the outside while I went in and tackled the "boss." I might have saved myself the trouble, however, as he was as cranky as a bear with a sore head, and he snapped me off so quick when I "struck" him for a job that I turned and walked out of the shop without another word.

Pittsburg and Vicinity.

The general situation presents nothing of special importance, the market still being of a waiting nature. There is very little demand from any quarter for any class of material, but production has been cut down to small proportions, so that there is not the urgency to sell that there was some time ago.

Any attempt to forecast the iron trade is fraught with dangers, despite the fact that visible signs all point in one direction. The comforting conclusion is drawn in some quarters that a return to the temporarily deserted economic and fiscal policies of the government will be accompanied with greater industrial activity and better prices.

The pig iron industry at present is the greatest sufferer. While many furnaces have gone out of blast, it must be considered that quite a number that have been idle are being fired up, including a few new ones. Southern furnacemen are better able to stand the depression than those of the north principally because they are not confronted with the drawbacks of high-priced raw materials. They have reduced their prices more and their production is comparatively higher.

During this period last year there was a decided boom in the iron market. It was simply an unexpected happening. At the present time buyers are inquiring around for quotations and taking good-sized lots when

anything can be had at the low prices ruling. Some of the manufacturers are of the belief that the average of prices for September will be better than those of August. The prices prevailing are as follows:

Grey forge, $11.50 to $11.75.
No. 1 foundry, $11.75 to $12.
No. 2 foundry, $10.75 to $11.
Charcoal foundry, No. 1, $16.50 to $17.
Charcoal foundry, No. 2, $16 to $16.25.
Bessemer, $10.50 to $11.

Coke—The production of coke has greatly decreased since the last report, nearly two thousand ovens closing down. The demand has been very poor, what few orders being placed, coming from the western district. Although the price list has furnace coke at $2, foundry at $2.30 and crushed at $2.35, these prices are not being adhered to.

The new addition to the plant of the Lloyd Booth Company, at Youngstown, to be used as a machine shop, will be a steel and brick building, 140x60 feet, with a two story lean-to 30 feet wide. The company has placed contracts with Manning, Maxwell and Moore for one "Shaw" patent 30-ton capacity by 60 foot span electric traveling crane of the three-motor type, one 54-inch swing by 40 foot bed engine lathe, one 30x30x8 inch planer. A new engine, boiler, generator and electric light plant will be installed, so that the new shop can be operated independent of the present machine shop, which latter will be used almost exclusively for roll turning and erecting.

The Leechburg Foundry & Machine Company of this city has contracted to furn'sh the La Belle Iron Works, of Wheeling, with a 22-inch cold rolling mill. The original plant consisted of four mills, which together with the new addition will make it one of the most complete of its kind in the country.

The Union Foundry & Machine Company of this place has just finished a shipment of machinery to the Washington (Pa.) steel and tin plate works, including a slitting shear, and has filled an order for tin house machinery from the Ellwood Tin Plate Company, Ellwood City, Pa. It is also furnishing two cranes for the new plant of the Blackham Manufacturing Company, at Zelienople, Pa.

A brass and iron foundry and an addition to the machine shop will be erected by the Hunt Air Brake Company, at New Kensington. The company will start up full in the near future.

The Totten & Hogg Iron and Steel Foundry Company, of this city, has an order from the Laughlin Nail Company, of Wheeling, W. Va., for some more rails, shears, etc. The company is also finishing and shipping the machinery for the Connellsville (Pa.) Steel, Iron and Tin Plate Company.

The foundries are not running to any degree of satisfaction. Of late the engine trade has been fairly well and some foundries are kept running rather steady, but generally speaking the trade is quiet and prices are low. Chilled rolls, up to 12 inches diameter, 3¾c per lb; chilled rolls, over 12 inches diameter, 3¼c per lb; sand and homogeneous steel rolls and pinions up to 12 inches diameter, 2¾c per lb; over 12 inches diameter, 2¾c per lb; V-tooth pinions, additional, 2¼c per lb; housen and rolling mill castings not otherwise specified, 2c per lb; spindles and coupling boxes, 1¾c per lb; squeezer castings, 2c per lb; squeezer pinions and wheels, 2½c per lb; spur and bevel wheels, large, 4c per lb; spur and bevel wheels, small, 3 to 2¼c per lb.

What is said to be the largest dynamo ever constructed has been constructed at the Westinghouse Machine Company, at East Pittsburg. It is for the Allegheny County Light Company, and weighs 90 tons. The field or base was cast in two sections, each weighing 56,000 pounds. Its base is 17 feet 6 inches, so that the armature will be 16 feet 5½ inches in diameter. The dynamo is of 1,500 killowat power. The contract calls for four dynamos.

The new foundry and machine shops of the George B. Sennett Company, at Youngstown, are being pushed rapidly to completion. The foundry and the boiler room is ready for the roofing and the machine shop is nearly so. Operations will be begun about October 1.

The Hinckley & Egery Iron Company, at Bangor, Me., are building an addition 60x60.

The Galusha Foundry at Rochester, N Y., suffered from a $2,000 fire Sept. 12th.

The Kurtz & Buhrer Foundry Company, at Chicago, have made an assignment.

J. M. Bell, of Fort Worth, Texas, has purchased a half interest in Dehart's foundry, at Red Oak, Ia.